

A CATALOGUE OF THE MOSSES OF PLUMAS NATIONAL FOREST, CALIFORNIA

COLIN P. DILLINGHAM

Plumas National Forest, 39696 Hwy 70, Quincy, CA 95971
cdillingham@fs.fed.us

ABSTRACT

245 described species, two undescribed species and four varieties of moss are documented on the Plumas National Forest, California representing approximately 35% of the California moss flora. Nineteen species are new records for the Sierra Nevada mountain range of California. The high rainfall on the western slope of the forest and associated habitat conditions allow for many disjunct coastal species. Four species, *Pohlia flexuosa* Harv. in Hook., *Schistidium subulaceum* H.H. Blom, *Scopelophila ligulata* (Spruce) Spruce, and *Sphagnum angustifolium* (Russow) C. Jensen in K. R. Tolf, were found new to California during this study. Five species, *Gemmabryum vinosum* J.R. Spence & Kellman, *Homalothecium californicum* Hedenäs, Huttunen, Shevock & D.R. Norris, *Orthotrichum confusum* R. Medina, F. Lara & Garilleti, *Ptychostomum pacificum* J.R. Spence & Shevock, and *Schistidium splendens* T.T. McIntosh, H. H. Blom, Toren & Shevock were recently described, partially using material collected as part of this study.

Key Words: Bryophytes, Butte County, moss, Northern California, Plumas County, Sierra County, Yuba County.

As part of a larger effort to more fully understand distribution patterns of bryophytes in California, it is necessary to systematically and carefully catalogue smaller geographical regions and political entities. Several collectors are contributing in this regard: David Toren in Lake and San Francisco counties, James Shevock in the southern Sierra Nevada and San Francisco County, Ken Kellman in Santa Cruz County, Paul Yurky (1995) in Marin County, and Alan Whitemore in San Mateo County. This study is an effort to fill in the void for the Plumas National Forest, which includes portions of Plumas, Butte, Sierra and Yuba counties, and by extension, the northern Sierra Nevada of California.

The Plumas National Forest is located approximately 20 km (12 mi) east of Oroville, California (see Fig. 1), and lies largely within the Sierra Nevada Mountain Range. The northeast portion of the National Forest is in the Diamond Mountains, with the portion north of the North Fork Feather River technically part of the Cascade Mountain Range. The Plumas National Forest covers approximately 8417 km² (3250 mi²). Elevation ranges from 488 m (1600 ft) near the shores of Lake Oroville to 2552 m (8372 ft) at the top of Mt. Ingalls. The vast majority of the Plumas National Forest is drained by the Feather River with two notable exceptions. The southeast portion is drained by the North Yuba River, and the eastern escarpment drains into Honey Lake.

CLIMATE

The study area is dominated by a Mediterranean climate, with mild and wet winters, and

warm and dry summers. Average rainfall varies greatly throughout the study area. The highest rainfall areas (average annual precipitation) are on the western portion of the study area at La Porte (2.05 m avg.) to more moderate annual precipitation at Quincy (0.97 m avg.) to dryer eastern portions of the study area at Portola (0.58 m avg.). Precipitation on the eastern portion of the study area is in the rain shadow of the Sierra Crest, and this portion of the study area is more influenced by Great Basin weather patterns. Therefore precipitation is more evenly spaced throughout the year than on the western portion of the study area, which is more heavily influenced by California's Mediterranean climate. Virtually all precipitation west of the Sierra crest falls between late October and early May. Elevations below 1219 m (4000 ft) are dominated by rain and elevations over 1219 m are dominated by snow (Troendle et al. 2007). Snow primarily falls between November and March. The vast majority of the moss substrate stays dry throughout the summer, with the obvious exception of wetland-type habitats. Shade created by dense forests moderates hot summer temperatures. Cold air sinks into steep river canyons. Combinations of these geographical and meteorological factors create a wide variety of microclimates.

MAJOR PLANT COMMUNITIES

Mixed coniferous and deciduous forests are the signature plant community of the National Forest, occupying much of the lower and middle elevations. These forests are variously composed of white fir (*Abies concolor* [Gordon & Glend.] Lindl.

ex Hildebr.), Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco), incense cedar (*Calocedrus decurrens* [Torr.] Florin), ponderosa pine (*Pinus ponderosa* P. Lawson & C. Lawson), Sugar Pine (*Pinus lambertiana* Douglas) and black oak (*Quercus kelloggii* Newb.). At lower elevations, such as in the Challenge area, tanoak (*Lithocarpus densiflorus* [Hook. & Arn.] Rehder) and madrone (*Arbutus menziesii* Pursh) become common components of the forest.

Red fir (*Abies magnifica* A. Murray bis) forests occur above 1676 m, and associated snowfall is heavy. The east side of the forest is dominated by yellow pine, both Jeffrey (*Pinus jeffreyi* Balf.) and ponderosa. The understory of east side pine forests often contains sagebrush (*Artemisia* L.), rabbitbrush (*Ericameria* Nutt.), and bitter brush (*Purshia tridentata* [Pursh] DC.). There are several types of oak woodlands and most are found at lower elevations on the western portion of the forest. Black oak is found in pure stands in a number of areas. Interior live oak (*Q. wislizenii* A. DC.) woodlands and canyon oak (*Q. chrysolepis* Liebm.) woodlands are found on steep slopes on canyon walls on the west slope.

Wet riparian zones of lower elevations of the western portion of the forest contain a host of tree species including big-leaf maple (*Acer macrophyllum* Pursh), Pacific yew (*Taxus brevifolia* Nutt.), California bay (*Umbellularia californica* [Hook. & Arn.] Nutt.), and white alder (*Alnus rhombifolia* Nutt.).

There are a variety of shrublands in the forest including types dominated by manzanita (*Arctostaphylos* Adans.), bitter cherry (*Prunus emarginata* [Douglas] Eaton), deer brush (*Ceanothus integrifolius* Hook. & Arn.), mountain whitethorn (*C. cordulatus* Kellogg), tobacco brush (*C. velutinus* Douglas), as well as lower elevation chaparral that includes species such as toyon (*Heteromeles arbutifolia* [Lindl.] M. Roem.).

High elevation wet meadows, springs, seeps and fen habitats are all important habitat types for bryophytes. These habitat types are uncommon, but are well represented by collections in this catalogue. Grasslands are common in valleys in private lands in the area of the flora, but are under represented in survey effort and collections.

GEOLOGY

The geology of the Plumas National Forest is diverse. There are areas with sedimentary, igneous, and metamorphic rocks. Sedimentary rocks include sandstone, shale, and limestone; basalt (volcanic) and granite (plutonic) among the igneous rocks; and marble and slate among the metamorphic rocks.

Granite, basalt, volcanic breccias, andesite, shale, and slate are among the most common rock types in the study area. Other less common

types include: volcanics such as rhyolite, metamorphic such as serpentinite and soapstone, and sedimentary types such as chert and sandstone. Very little limestone or marble occur in the Plumas National Forest and associated calcareous habitats and associated mosses are rare. Some of these limestone deposits were developed during the Paleozoic Era and are marine deposits. They are found just south of Eureka Peak and others are found in the Middle Fork Feather River at Milsap Bar and Little Volcano Mountain (Clifton 2003). Travertine, a variety of limestone deposited from underground water that has returned to the surface as a spring also occurs on the Plumas, such as along Hwy 89 near Indian Falls on Indian Creek (Durrell 1987). For a thorough understanding of the geology of the area, readers should refer to the *Geologic History of the Feather River Country, California* by Durrell (1987).

COLLECTION HISTORY

There is a limited history of bryophyte collection within the Plumas National Forest. The oldest collections definitely traceable to the Plumas National Forest were made in 1893 by Rebecca Merritt Austin. Prior to this study, only sporadic and short-term visits have been made to the county by a variety of collectors. The most notable among these are Leiberger (1900), Ikenberry (1933–1934), L. Koch (1934–1947), Elva Lawton (1955), B. Weber (1975), D. Showers (1976), and L. Janeway (1998–1999). Until this study, there has never been a concentrated effort to inventory the bryophytes of the Plumas National Forest.

METHODS

This project was initiated on the unlikely date of September 11, 2001, just hours after the terrorist attack on the twin towers in New York City. A group of botanists assembled including Dan Norris, Nancy Hillyard, Linnea Hanson, and the author for a three day bryophyte collecting trip around the Plumas National Forest. It was during this initial trip that the author recognized the lack of understanding of the bryoflora of the region. Since that initial collecting foray, the author has continually gathered moss collections from 2001 to 2015, from diverse locations and elevations throughout the study area. Many general localities were collected more than once at different times of the year. Collection data recorded on herbarium specimens includes Universal Transverse Mercator (UTMs), Legal Location (Township, Range, and Section), elevation, substrate and habitat. UTM's were mostly determined with a handheld global positioning system (GPS) receiver. Occasionally, UTM's were estimated by plotting the location using ArcGIS and USGS Topographic maps. These collections are housed in the

following herbaria: Rebecca Merritt Austin herbarium located in the Plumas National Forest offices in Quincy and Oroville (RMA), University of California Berkeley (UC), California State University at Chico (CHSC), California Academy of Sciences (CAS), Duke University (DUKE), Florida Museum of Natural History (FLAS), Missouri Botanical Garden (MO), University of Alaska Museum of the North (ALA), Polish Academy of Sciences (KRAM), Universidad Autonoma de Madrid (MAUAM), University of British Columbia (UBC), Flatberg (personal herbarium). Specimens duplicated at RMA are not specifically acknowledged if also deposited at another herbarium. A large portion of the RMA herbarium is in the process of being transferred to CAS.

Herbarium searches were conducted on line for MO, NY, and CHSC. A list of specimens from the study area were provided by CAS and CHSC and labels examined. Site visits to UC and CHSC were conducted and specimens were examined. Individual specimens from CAS, CHSC, and UC herbaria were borrowed and have been examined. Nearly all species in this catalogue have been independently determined by at least two bryologists. A few species that were represented in the catalogue by a single collection or that were identified by a single examiner have a note following the species account in Appendix 1 indicating that the species was not verified by multiple bryologists.

Identification of specimens has been accomplished using various moss floras from North America and beyond (Flora of North America Editorial Committee 2007, 2014; Malcolm et al. 2009; Norris and Shevock 2004b; Crum and Anderson 1981; Flowers 1973; Lawton 1971; Sharp, Crum and Eckel 1994; Smith 1978). Difficult collections were sent to appropriate authorities for confirmation or determination. See the acknowledgement section for a list of bryologists who made or confirmed determinations.

RESULTS

Approximately 2400 specimens were examined, including over 2000 that were made by the author. Two hundred and forty-five (245) species and four varieties in 102 genera were documented in the study area (see Appendix 1) representing approximately 35% of the California moss flora. Of these species, nineteen are reported new to the Sierra Nevada of California. Four species were reported as new to California based on this study: *Pohlia flexuosa* Harv. in Hook., *Schistidium subulaceum* H.H. Blom, *Scopelophila ligulata* (Spruce) Spruce and *Sphagnum angustifolium* (Russow) C. Jensen. Five species, *Gemmabryum vinosum* J.R. Spence & Kellman, *Homalothecium californicum* Hedenäs, Huttunen, Shevock & Norris, *Orthotrichum confusum* R. Medina, F. Lara & Garilleti, *Ptychostomum pacificum* J.R. Spence & Shevock

and *Schistidium splendens* T.T. McIntosh, H.H. Blom, D.R. Toren & Shevock were recently described partially using material collected from this study.

Two taxa collected during this study are presently undescribed. These may be described by various authors in other publications.

Collections made during this study within the genus *Scleropodium* Bruch & Schimp. were used by Carter (2014b) to aid with a global revision to the genus.

The catalogue is divided into four sections. All are sorted alphabetically by genus and then by species. Appendix 1 includes all described species and varieties that have been inventoried for the Plumas National Forest and encompassed lands of other ownership. It includes a subjective assessment of the abundance of the species, a short description of the habitats of the moss, regularity of sporophyte occurrence, and a few representative collections illustrating the range of the species. Emphasis for the selection of cited collections is given to represent a minimum of one collection for each of the four counties if available. Collections have also been chosen to highlight elevational extremes, variation in habitat, and those by a variety of collectors and of earliest record. Specimens that have been verified by more than one bryologist are favored over those identified by only one person.

Subjective abundance is assessed as follows: **Rare**, found only once or twice in the study area and not known in large quantities from neighboring areas; **Uncommon**, found occasionally within appropriate habitat; **Common**, regularly within appropriate habitat; **Abundant**, most often found in large quantities within appropriate habitats. This information is entirely from the author's experience and collections in the study area, and from discussions with other California bryologists. Whereas the number of collections examined is commonly used as an indication of abundance, that number can be misleading. Often collections are made in the field because two species are macroscopically similar, thus overemphasizing the relative abundance of one or the other. Similarly, certain uncommon or special status and distinctive species (*Meesia* Gaertn. for example) are generally collected every time they are encountered, while easily recognized abundant species are often under collected. Many groups are undercollected, such as ephemeral mosses, and abundance estimates are likely conservative. This is a preliminary effort, and with more collections, abundance estimates are likely to change.

Collection data are listed with the following fields: County: habitat, short geographical location, reference to nearest community or recognizable landmark, year, elevation, collector, collection number, and herbarium. The initials CPD designate collections by the author. Nomenclature follows the standards set in the recently

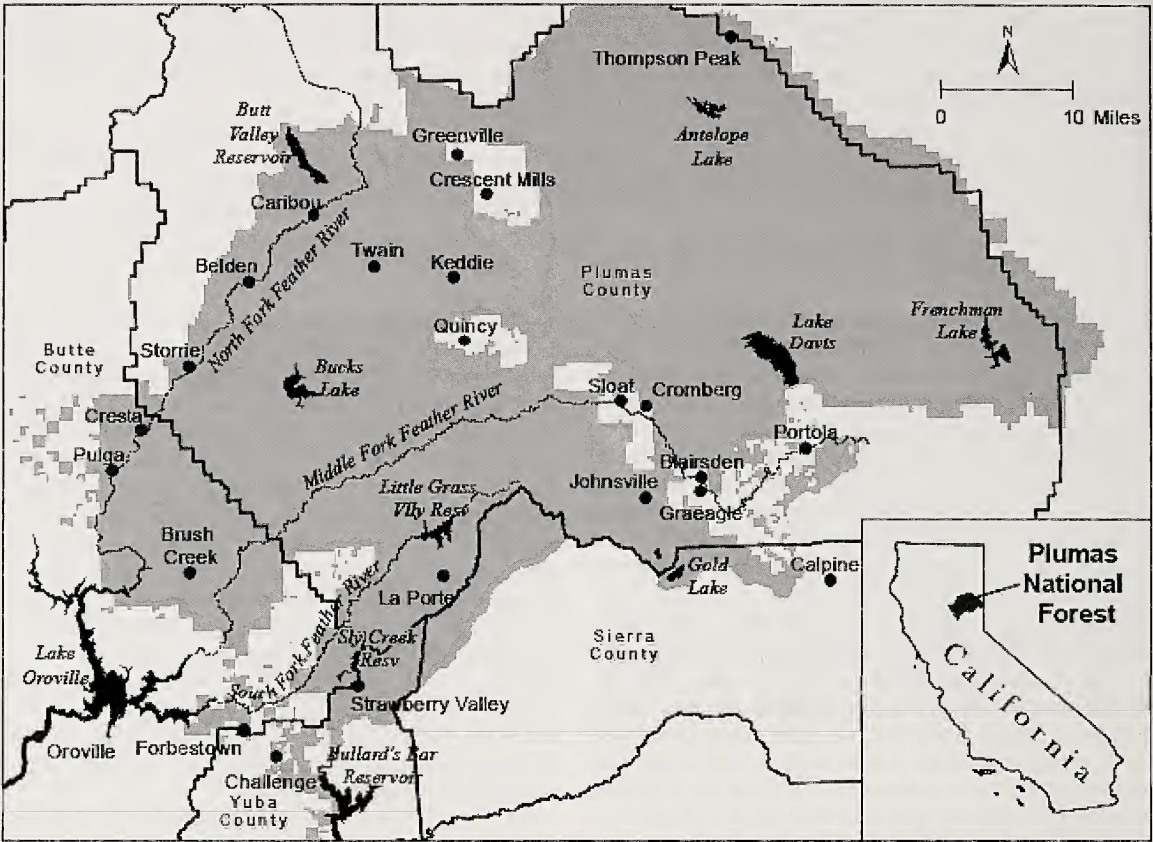


Figure 1. Study area of Plumas National Forest (gray shaded area) with Butte, Plumas, Sierra and Yuba counties (black lines). Place names included for geographic reference in association with collections in catalogue (Appendix 1). Inset: map of California showing Plumas National Forest in dark gray shaded area.

completed Flora of North America (2007, 2014) project. The Missouri Botanical Garden’s online Tropicos database (2014) was consulted often to help clarify valid taxa. Where I have deviated from these works, I have added a note to explain my reasoning. Collections give spatial references to communities or well-known localities in the study area. Locations for these sites can be seen in the map in Figure 1.

Recent published work has changed some generic concepts for species widespread in the study area. Some genera published in Norris and Shevock (2004), which is a common resource for California field bryologists, are now listed under other generic names. *Bryum* Hedw. and *Racomitrium* Brid. are two such widespread genera with many species in the study area.

The genus *Bryum* has recently been split into several genera (Spence 2014). This author has decided to follow the new generic segregates. The following genera include species previously located in *Bryum sensu lato*. *Gemmabryum* J.R. Spence & H.P. Ramsay includes *G. badium* (Brid.) J.R. Spence, *G. barnesii* (J.B. Wood ex Schimp.) J.R. Spence, *G. caespiticium* (Hedw.) J.R. Spence, *G. dichotomum* (Hedw.) J.R. Spence

& H.P. Ramsay, *G. vinosum*, J.R. Spence & Kellman, and *G. violaceum* (Crundw. & Nyholm) J.R. Spence. *Imbriobryum* N. Pederson includes *I. alpinum* (Huds. ex With.) N. Pedersen, *I. gemmiparum* (De Not.) J.R. Spence, *I. minutum* (Lesq.) J.R. Spence, *I. muehlenbeckii* (Bruch & Schimp.) N. Pedersen, and *I. torenii* J.R. Spence & Shevock. *Ptychostomum* Hornsch. includes *P. creberrimum* (Taylor) J.R. Spence & H.P. Ramsay, *P. pacificum* J.R. Spence & Shevock, *P. pseudotriquetrum* (Hedw.) J.R. Spence & H.P. Ramsay ex Holyoak & N. Pedersen, and *P. weigeli* (Spreng.) J.R. Spence. *Rosulabryum* J.R. Spence includes *R. canariense* (Brid.) Ochyra, *R. capillare* (Hedw.) J. R. Spence, *R. gemmascens* (Kindb.) J.R. Spence, and *R. torquescens* (Bruch & Schimp.) J.R. Spence. The account for genus *Bryum (sensu stricto)* and the remaining four genera are arranged alphabetically in this flora.

Racomitrium, in the broadest sense, is a recognizable group of mosses based on the combined characters of basal cells having thick and sinuous cell walls, cladocarpous habit and with linear peristome teeth that are divided nearly to the base. However, recent studies by Ochyra and Benarek-Ochyra (Ochyra 2007) culminated in splitting

this group at the genus level into four genera, *Racomitrium* in the narrow sense, *Bucklandiella* Roiv., *Codriophorus* P. Beauv., *Niphotrichum* (Bednarek-Ochyra) Bednarek-Ochyra & Ochyra, and more recently Sawicki et al. (2015) created a new monospecific genus, *Frisvollia* Sawicki, Szczecińska, Bednarek-Ochyra & Ochyra. However, Larrain et al. (2013) make an excellent case using molecular data that the genus *Racomitrium* should be recognized in the broadest sense, and suggest using the traditional generic concept of *Racomitrium*. Although I would like to follow Larrain et al. (2013) and lump *Racomitrium*, I instead have decided to be consistent with leading California field bryologists (J. Shevock, D. Toren and K. Kellman, personal communication 2015) and follow the generic splits used by Ochyra (2007) and Sawicki et al. (2015).

Appendix 2 is an annotated list of the excluded species previously published from the study area.

Appendix 3 is a short list of mosses that might reasonably be expected to be found in the Plumas National Forest, but have yet to be collected. Plants are included in this section if they have been collected in nearby counties, and appropriate habitat exists in the Plumas National Forest. Due to the preliminary nature of this study, it would not be surprising to find at least some of these taxa in the study area, as well as others that are not on this list.

Appendix 4 lists mosses by several habitat types. Some of the mosses reported from each habitat are not necessarily strictly associated with that habitat, but have been found in that habitat on the Plumas National Forest.

DISCUSSION

It is evident that the limited collection history on the Plumas National Forest has resulted in a limited knowledge of the moss flora. Two apparent species found in the study area are as yet undescribed. The nineteen mosses that are new to the Sierra Nevada Mountains represent major range extensions for their respective taxa. It remains to be seen if these collections represent continuous range extensions or disjunct populations.

The position of the western slope of the Plumas National Forest is in a high rainfall zone (approximately two meters per year) and has a similar climate to that of the Coast Range. Several species, otherwise not known from the Sierra Nevada Mountain Range, have been found in this area with a high moisture regime and represent major range extensions for these taxa. This is the case with such taxa as *Alsia californica* (Hook. & Arn.) Sull., *Brachythecium acutum* (Mitt.) Sull., *Buxbaumia viridis* (DC.) Moug. & Nestl., *Campylopus introflexus* (Hedw.) Brid., *Dicranum howellii* Renaud & Cardot, *Didymodon eckeliae* R.H. Zander, *Entosthodon attenuatus* (Dicks.) Bryhn,

Epipterygium tozeri (Grev.) Lindb., *Fissidens pauperculus* M. Howe, *Homalothecium megaptitulum* (Sull.) H. Rob., *Hypnum circinale* Ando, *Neckera douglasii* Hook., *Rhynchostegium aquaticum* A. Jaeger, *Pohlia annotina* (Hedw.) Lindb., *Rhytidadelphus triquetrus* (Hedw.) Warnst., and *Sphagnum angustifolium* (refer to Appendix 1 for full authorities).

The Mediterranean climate also allows for a rich suite of species that inhabit the trunks of trees at lower elevations (<3,000 ft) in the study area. Many hardwood tree trunks, and even some Douglas-firs, have the lower six feet or so completely covered in mosses in mesic riparian zones, and many of the epiphytic mosses (e.g., *Dendroalsia abietina* [Hook.] E. Britton ex Broth., *Isoetichum cristatum* [Hampe] H. Rob. and *Orthotrichum papillosum* Hampe) are abundant. Temperatures are cool in the winter when the bark is wet, providing ideal conditions for bryophyte growth. Higher temperatures are present only in the summer, when the mosses are protected by desiccation (Shaw and Goffinet 2000). This is not the case for higher elevations in the study area where epiphytic mosses are limited by a lack of available water in the winter, and in the summer, when occasional storms do bathe the trunks; temperatures are too high for optimal growth.

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LITERATURE CITED

- BURYOVA, B. 2004. Morphological and genetic variation in selected species of the genus *Philonotis* (Bartramiaceae, Bryopsida). Ph.D. Dissertation, Charles University, Prague.
- CARTER, B. E. 2012a. Species delimitation and cryptic diversity in the moss genus *Scleropodium* (Brachytheciaceae). *Molecular Phylogenetics and Evolution* 63:891–903.
- . 2012b. *Scleropodium occidentale* (Brachytheciaceae) a new moss species from western North America. *The Bryologist* 115:222–230.
- . 2014a. Ecology and distribution of the introduced moss *Campylopus introflexus* (Dicranaceae) in western North America. *Madroño* 61:82–86.
- . 2014b. A global revision of *Scleropodium* (Brachytheciaceae, Bryophyta). *Systematic Botany* 39: 681–697.
- CLIFTON, G. 2003. Plumas County and Plumas National Forest Flora. Unpublished manuscript. 334 pp [copy in Plumas NF headquarters].
- CRUM, H. A. AND L. E. ANDERSON. 1981. Mosses of eastern North America. Columbia University Press, New York, NY.
- DURRELL, C. 1987. Geologic history of the Feather River country, California. University of California Press, Berkeley, CA.
- ECKEL, P. M. 2007. *Dichodontium*. Pp. 382–386 in Flora North America Editorial Committee (eds.). *Flora of North America North of México*, Vol. 27: Bryophyta: Mosses, part 1. Oxford University Press, New York, NY.
- FERNANDEZ, C. C., J. R. SHEVOCK, A. N. GLAZER, AND J. N. THOMPSON. 2006. Cryptic species within the cosmopolitan desiccation-tolerant moss *Grimmia laevigata*. *Proceedings of the National Academy of Sciences of the United States of America* 103:637–642.
- FLORA NORTH AMERICA EDITORIAL COMMITTEE (eds.). 2007. *Flora of North America North of México*, Vol. 27: Bryophyta: Mosses, part 1. Oxford University Press, New York, NY.
- FRAHM, J.-P. 2007. *Campylopus*. Pp. 366–376 in Flora North America Editorial Committee (eds.). *Flora of North America North of México*, Vol. 27: Bryophyta: Mosses, part 1. Oxford University Press, New York, NY.
- . 2014. *Flora of North America North of México*, Vol. 28: Bryophyta: Mosses, part 2. Oxford University Press, New York, NY.
- FLOWERS, S. 1973. Mosses: Utah and the West. Brigham Young University Press, Provo, Utah.
- HASTINGS R. I. AND H. C. GREVEN. 2007. *Grimmia*. Pp. 225–258 in Flora North America Editorial Committee (eds.). *Flora of North America North of México*, Vol. 27: Bryophyta: Mosses, part 1. Oxford University Press, New York, NY.
- HEDENÄS, L., S. HUTTUNEN, J. R. SHEVOCK, AND D. H. NORRIS. 2009. *Homalothecium californicum* (Brachytheciaceae), a new endemic species to the California Floristic Province, Pacific Coast of North America. *The Bryologist* 112:593–604.
- IGNATOV, M. S. 2014. *Brachytheciaceae*. Pp. 404–468 in Flora North America Editorial Committee (eds.). *Flora of North America North of México*, Vol. 28: Bryophyta: Mosses, part 2. Oxford University Press, New York, NY.
- KELLMAN, K. M. 2003. A catalogue of the mosses of Santa Cruz County, California. *Madroño* 50:61–82.
- LARRAIN, J., D. QUANDT, M. STECH, AND J. MUÑOZ. 2013. Lumping or splitting? The case of *Racomitrium* (Bryophytina: Grimmiaceae). *Taxon* 62: 1117–1132.
- LAWTON, E. 1971. Moss flora of the Pacific Northwest. Hattori Botanical Laboratory. Nichinan, Miyazaki, Japan.
- MALCOLM B., N. MALCOLM, J. R. SHEVOCK, AND D. H. NORRIS. 2009. California Mosses. Microptics Press, Nelson, New Zealand.
- MEDINA, R. F. LARA, B. GOFFINET, R. GARILLETI, AND V. MAZIMPAKA. 2012. Integrative taxonomy successfully resolves the pseudo-cryptic complex of the disjunct epiphytic moss *Orthotrichum consimile* s.l. (Orthotrichaceae). *Taxon* 61:1180–1198.
- MCINTOSH, T. T. 2007. *Schistidium*. Pp. 207–225 in Flora North America Editorial Committee (eds.). *Flora of North America North of México*, Vol. 27: Bryophyta: Mosses, part 1. Oxford University Press, New York, NY.
- MCINTOSH, T. T., H. H. BLOM, D. R. TOREN, AND J. R. SHEVOCK. 2015. Two new species of *Schistidium* (Grimmiaceae, Bryophyta) from western North America. *Phytologia in press*.
- NORRIS, D. H. AND J. R. SHEVOCK. 2004a. Contributions toward a Bryoflora of California: I. A specimen-based Catalogue of Mosses. *Madroño* 51:1–131.
- . 2004b. Contributions toward a Bryoflora of California: II. A key to the Mosses. *Madroño* 51: 133–269.
- OCHYRA, R. 2007. *Grimmiaceae* subfam. *Racomitrioidae*. Pp. 266–305 in Flora North America Editorial Committee (eds.). *Flora of North America North of México*, Vol. 27: Bryophyta: Mosses, part 1. Oxford University Press, New York, NY.
- SAWICKI, J., M. SZCZECIŃSKA, H. BEDNAREK-OCHYRA, AND R. OCHYRA. 2015. Mitochondrial phylogenomics supports splitting the traditionally conceived genus *Racomitrium* (Bryophyta: Grimmiaceae). *Nova Hedwigia* 100:293–317.
- SCHOFIELD, W. B. 2007. *Dicranoweisia*. Pp. 395–397 in Flora North America Editorial Committee (eds.). *Flora of North America North of México*, Vol. 27: Bryophyta: Mosses, part 1. Oxford University Press, New York, NY.
- . 2014. *Isoetecium*. Pp. 618–621 in Flora North America Editorial Committee (eds.). *Flora of North America North of México*, Vol. 28: Bryophyta: Mosses, part 2. Oxford University Press, New York, NY.
- SHARP, A. J., H. CRUM, AND P. M. ECKEL (eds.). 1994. The moss flora of Mexico. *Memoirs of the New York Botanical Garden* 69:1–1113.
- SHAW, A. J. AND B. GOFFINET (eds.). 2000. Bryophyte biology. Cambridge University Press, Cambridge.
- AND D. R. TOREN. 2009. *Pohlia flexuosa* (Mielichhoferiaceae) in North America. *The Bryologist* 112:178–183.

SHAW, A. J., G. K. GOLINSKI, E. G. CLARK, B. SHAW, H. K. STENØIEN, AND K. I. FLATBERG. 2014. Intercontinental genetic structure in the amphi-Pacific peatmoss *Sphagnum miyabeum* (Bryophyta: Sphagnaceae). *Biological Journal of the Linnean Society* 111:17–37.

SMITH, A. J. E. 1978. *The moss flora of Britain and Ireland*. Cambridge University Press, Cambridge University Press. Cambridge, England.

SPENCE, J. R. 2014. *Bryaceae*. Pp. 117–185 in *Flora North America Editorial Committee* (eds.), *Flora of North America North of México*, Vol. 28: Bryophyta: Mosses, part 2. Oxford University Press, New York, NY.

———AND K. M. KELLMAN. 2015. New and Interesting species of *Gemmabryum* J.R. Spence & H.P. Ramsay (Bryaceae, Bryopsida) from California and the West. *Madroño* 62(2):124–135.

———AND J. R. SHEVOCK. 2015. *Ptychostomum pacificum* (Bryaceae), a new fen species from California, Oregon, and Western Nevada. *Madroño* 59: 156–162.

———. 2015. *Imbriobryum torenii* (Bryaceae), a new species from western North America *Madroño* 62:68–72.

TROENDLE, C. A., J. M. NANKERVIS, AND A. PEAVY. 2007. The Herger-Feinstein Quincy Library Group Project – impacts of vegetation management on water quality. Available at http://www.fs.fed.us/r5/hfqlg/monitoring/resource_reports/hydrology_and_fisheries/Water_Yield_Full_Report_Feb242007.pdf

TROPICOS, Botanical Information System At The Missouri Botanical Garden. Webpage www.tropicos.org (accessed 1 March 2014).

VANDERPOORTEN, A. 2014. *Hygroamblystegium*. Pp. 301–304 in *Flora North America Editorial Committee* (eds.), *Flora of North America North of México*, Vol. 28: Bryophyta: Mosses, part 2. Oxford University Press, New York, NY.

VITT, D. H. 2014. *Orthotrichaceae*. Pp. 37–62 in *Flora North America Editorial Committee* (eds.), *Flora of North America North of México*, Vol. 28: Bryophyta: Mosses, part 2. Oxford University Press, New York, NY.

YURKY, P. 1995. A preliminary checklist of bryophytes of Marin County, California. *Evansia* 12:121–134.

APPENDIX 1

Catalogue: taxa preceded by an asterisk (*) denote those not known to have been collected from the Sierra Nevada Mountain Range prior to this study. Those marked with a double asterisk (**) denote taxa that are reported new to California. Controversial or recently changed names are listed below the name that I have accepted for the taxon.

**Alsia californica* (Hooker & Arnott) Sullivant
Rare; on the bark of trees. Sporophytes present on only collection.

Yuba: on *Lithocarpus densiflorus* tree bole mixed with *Dendroalsia abietina*, three mi SE of Challenge, 2003, 2350 ft, *CPD* 989 (CAS, UC).

Amblystegium serpens (Hedwig) Schimper
Common; on wood and moist soil around water. Sporophytes common.

Plumas: on *Darmera peltata* (Torr. ex Benth) Voss roots in Grizzly Creek, two mi SW of Bucks Lake, 2004, 5028 ft, *CPD*, *Toren & Friend* 1560 (CAS); on *Abies magnifica* log in fen-like wetland at headwaters of Taylor Creek, nine mi NE of Quincy, 2004, 6907 ft, *CPD & Toren* 1666 (CAS); on saturated wood in spring in headwaters of Betterton Creek, two mi NE of Graeagle, 2004, 5490 ft, *CPD* 1502 (UC).

Note: I concur with Crum and Anderson (1981) in that *Amblystegium juratzkanum* Schimper and *A. serpens* represent a nearly impossible continuum and I have followed their work. To base separation on a character such as wide-spreading leaves in species that occur in changing environments is unreasonable. Specimens previously determined as *A. juratzkanum* are listed as *A. serpens* for this work (*CPD & Toren* 1660 [CAS], *CPD & Toren* 1695 [CAS, UC]). Vanderpoorten, in his *Flora of North America* (2014) treatment of *Amblystegium*, also agrees with this interpretation.

Amphidium californicum (Hampe ex Müller Hal.) Brotherus
Uncommon; on shaded rocks. No collections with sporophytes.

Butte: on ephemerally moist vertical rock face under rock overhang along Ponderosa Rd, two mi NW of Forbestown, 2003, 1588 ft, *CPD* 1125 (UC); on massive granitic rock in Feather River Canyon immediately E of Arch Rock, 2006, 1575 ft, *Shevock* 28914 (CAS).

Plumas: on metamorphic rock on Middle Fork Feather River at Red Bridge Campground, about six mi SE of Quincy, 2002, 3900 ft, *Laeger* 1573 (CAS). *Sierra*: on shaded rock crevice of rock outcrop above Rock Creek, six mi S of LaPorte, 2005, 3800 ft, *CPD* 1908 (RMA).

Anacolia baueri (Hampe) Paris
Uncommon; generally on shaded, moist rocks, generally vertical and substantial. One collection with sporophytes.

Butte: on ephemerally moist vertical rock face under rock overhang along Ponderosa Rd, two mi NW of Forbestown, 2003, 1588 ft, *CPD* 1126 (UC). *Plumas*: on moist vertical rock adjacent to cascading tributary of Greenhorn Creek, seven mi E of Quincy, 2004, 3794 ft, *CPD* 1291 (RMA); on open volcanic conglomerate rock in ephemeral seep with no canopy in mixed *Purshia tridentata* and *Artemisia tridentata* shrub community, two mi N of Graeagle, 2005, 5387 ft, *CPD* 1481 (RMA). *Sierra*: on shaded crevice of rock outcrop above Rock Creek, six mi S of LaPorte, 2005, 3800 ft, *CPD* 1897 (RMA).

Note: *Flora of North America* treats this as a subspecies of *A. menziesii*. I have followed Norris and Shevock (2004a) in recognizing it at species level. I used branch tip characters identified by Norris and Shevock (2004b) to determine species when sporophytes were not present.

Anacolia menziesii (Turner) Paris
Uncommon; on shaded rocks of road cuts or outcrops in forest. Sporophytes common.

Butte: on granitic rock on road cut, along Hwy 70, 10 mi NE of Paradise, 2009, 1500 ft, *CPD* 2555 (CAS).

Plumas: on dry rock along Yellow Creek Trail, 16 mi NW of Quincy, 2006, 2280 ft, *CPD*, *B. Shaw, Shevock & Kellman* 2360 (CAS); on dry rock talus along North Fork Feather River Trail, 15 mi NW of Quincy, 2006, 3000 ft, *CPD*, *Kellman, B. Shaw, Slack, Shevock & Wilson* 2358 (RMA).

Andreaea heinemannii Hampe & Müller Hal.

Uncommon; on rock outcrops under sparse to dense forest canopy. Sporophytes common.

Butte: on granite outcrop, 1.5 mi W of Cresta and 18 mi E of Chico, 2004, 3036 ft, *CPD & Toren 1740* (ALA, CAS). **Plumas:** on dry granite outcrop, five mi S of Antelope Lake, 4677 ft, *CPD & Toren 2201* (ALA, CAS); on granite boulder under dense forest canopy, three mi NW of Johnsville, 2008, 5280 ft, *CPD 2438* (ALA). **Sierra:** on metamorphic rock outcrop under light forest canopy, three mi E of LaPorte, 2005, 4961 ft *CPD & Toren 2300* (UC).

Note: all specimens were determined or verified by Barbara Murray at University of Alaska.

Anomobryum julaceum (Schrader ex P. Gärtner, B. Meyer & Scherbius) Schimper

Rare; on thin soil over rock at low elevations. No collections with sporophytes.

Butte: on thin soil in ephemeral moist, near-vertical, rocky road cut on Camp Creek Rd, 0.7 mi NE of Pulga, 2004, 1607 ft, *CPD 1728* (MO – verified by Zander, UC, CHSC); on thin granitic sandy soils over rock 100 yards up dirt road from Shady Rest Area, 2006, 1560 ft, *CPD 2345* (CAS).

Antitrichia californica Sullivant ex Lesquereux

Common; on the bases of hardwood trees, especially *Quercus kelloggii* and less commonly on conifers, also common on rocks in diffuse or full sunlight. Sporophytes uncommon.

Butte: on rock in dry creek bed under forest canopy in the headwaters of Brush Creek, 1/2 mi E of Brush Creek community, 2002, 3680 ft, *CPD 854* (CAS); on rock outcrop under dense forest canopy in the headwaters of Woodleaf Creek, 1 mi N of Woodleaf, 2003, 2940 ft, *CPD 1004* (CAS); on *Acer macrophyllum* bole on edge of meadow, three mi NE of Forbestown, 2003, 2900 ft, *CPD 1100* (CAS). **Plumas:** on base of *Quercus kelloggii* at Mt. Hough Ranger Station, three mi N of Quincy, 2003, 3400 ft, *CPD 815*, (MO). **Sierra:** on bark of fallen old-growth *Pseudotsuga menziesii* under forest canopy and adjacent to Little Rock Creek, six mi S of LaPorte, 2005, 3920 ft, *CPD 1865* (CAS). **Yuba:** on base of *Quercus kelloggii*, six mi SE of Challenge, 2003, 2740 ft, *CPD 948* (CAS).

Atrichum selwynii Austin

Common on soil of stream banks in the shade. Sporophytes common.

Butte: on soil under forest canopy in the headwaters of Mosquito Creek, 1/4 mi N of Brush Creek community, 2002, 3057 ft, *CPD 517* (UC); on thin duff layer over mineral soil at margin of Lockerman Creek underneath dense forest canopy, two mi NW of Cresta, 2004, 3140 ft, *CPD & Toren 1781* (CAS). **Plumas:** on soil in splash zone of small waterfall along tributary to South Branch Middle Fork Feather River, 24 mi NE of Oroville, 2002, 1171 m, *CPD 904*, (CAS). **Yuba:** on soil adjacent to small stream at historical site of Milk Ranch, three mi SE of Challenge, 2003, 2450 ft, *CPD 979* (CAS).

Aulacomnium androgynum (Hedwig) Schwägrichen

Abundant; on rotting wood in forests; also less common on soil or rock. Sporophytes uncommon, gemmae stalks common.

Butte: on rotting wood under dense forest canopy, 1.5 mi E of Brush Creek community, 2002, 2763 ft,

CPD 510 (CAS). **Plumas:** on rotting wood adjacent to Denten Creek, 1 mi E of Graeagle, 2004, 4700 ft, *CPD & Miller 1362* (CAS). **Sierra:** on rock face adjacent to tributary to Rock Creek at historic mining town of Union Hill, five mi S of LaPorte, 2005, 4042 ft, *CPD 1931* (CAS). **Yuba:** on roadside soils underneath forest canopy on access rd to Burnt Ridge Campground, five mi SE of Challenge, 2003, 2220 ft, *CPD 960* (CAS).

Aulacomnium palustre (Hedwig) Schwägrichen

Common; on wet boggy soils and saturated wood in fens, wet meadows, seeps and springs. Sporophytes and gemmae stalks uncommon.

Plumas: on saturated soil at wet meadow edge at Grassy Lake, Lakes Basin, six mi SW of Graeagle, 2001, 6320 ft, *CPD, Norris & Hanson 444*, (RMA); on rock in seep underneath mixed conifer forest in tributary to Rabbit Creek, 1 mi W of LaPorte, 2005, 4890 ft, *CPD & Toren 2029* (RMA); on moist soil at base of *Pinus contorta* stump at Little Summit Lake, 17 mi E of Quincy, 2005, 5856 ft, *CPD 2108* (RMA). **Sierra:** on wet peat soils in open meadow at McNair Meadow, 1.5 mi NW of Calpine, 2003, 1613 m, *CPD 901* (RMA).

Barbula convoluta Hedwig

Rare; on disturbed soil or charred wood with soil. Sporophytes present on both collections.

Plumas: on dry soil of roadside cutbank near South Fork of Long Valley Creek, four mi E of Cromberg, 2004, 5845 ft, *CPD 1598* (RMA). **Yuba:** on damp charred tree stump at ground level with soil mixed in substrate, five mi SE of Challenge, 2010, 2000 ft, *Toren 9737* (RMA).

Bartramia ithyphylla Bridel

Uncommon; on shaded soil and rock. Sporophytes common.

Sierra: on shaded soil over exposed root under forest canopy along Potosi Creek, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2223* (RMA); on slate bedrock under 20% forest canopy in Cedar Grove Ravine, three mi E of LaPorte, 2005, 4745 ft, *CPD & Toren 2281* (RMA).

Blindia acuta (Hedwig) Bruch & Schimper

Uncommon; on wet seeping rock faces. Sporophytes uncommon.

Sierra: on wet seeping rock on stream bank of Gold Run Creek under dense forest canopy, five mi SW of LaPorte, 2005, 4100 ft, *CPD & Toren 1994* (UC); on moist vertical rock face at "Wink Eye Mine" under forest canopy along Potosi Creek, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2229*; on slate bedrock under 20% forest canopy in Cedar Grove Ravine, three mi E of LaPorte, 2005, 4745 ft, *CPD & Toren 2283* (RMA).

Brachytheciastrum collinum (Schleicher ex Müller Hal.) Bruch & Schimper

Uncommon, on dry rock outcrops on E side of Plumas National Forest. No collections with sporophytes.

Plumas: on exposed volcanic conglomerate rock outcrop on ridge above Cascade Creek, 13 mi E of Quincy, 2005, 6625 ft, *CPD & Toren 2086* (UC); on dry volcanic conglomerate rock outcrop along lower Emigrant Creek, 15 mi E of Quincy, 2005, 5909 ft, *CPD 2105* (RMA); on granitic rock outcrop under forest canopy along Cold Stream, 2.5 mi S of Antelope Lake, 2005, 5799 ft, *CPD & Toren 2217* (RMA).

Brachytheciastrum leibergii (Grout) Ignatov & Huttunen
Uncommon; on moist wood, rocks or soil, often at margins of seeps, springs and creeks, also in upland sites, underneath moderate to dense forest canopy. Sporophytes common.

Butte: on rotten wood underneath dense forest canopy, six mi E of Brush Creek community, 2002, 3876 ft, *CPD & Gross 1055* (RMA). **Plumas:** on soil and over small rock under dense forest canopy, three mi E of Portola, 2002, 5240 ft, *CPD 578* (UC); on moist soil at margin of headwaters of Cascade Creek underneath dense forest canopy, 13 mi E of Quincy, 2005, 6472 ft, *CPD & Toren 2088* (RMA). **Sierra:** on organic moist soil under dense forest canopy along tributary to Potosi Creek, six mi NE of LaPorte, 2005, 5793 ft, *CPD & Toren 2306* (RMA).

Brachytheciastrum velutinum var. *velutinum* (Hedwig) Ignatov & Huttunen

Common; on tree bases, rotting wood, soil and rock and generally under forest canopy. Sporophytes common.

Butte: on exposed root near small creek underneath dense forest canopy, 1.5 mi W of Cresta, 2004, 3206 ft, *CPD & Toren 1752* (RMA). **Plumas:** on exposed root of *Abies concolor* underneath dense forest canopy, four mi W of Little Grass Valley Reservoir, 2002, 5240 ft, *CPD 781* (RMA, Harpel personal herbarium); shaded soil of streambank, 1984, 1200 m, adjacent to Hwy 89, three mi S of Crescent Mills, *Norris 69938* (UC). **Sierra:** on rotting wood on forest floor underneath dense forest canopy, six mi S of LaPorte, 2005, 3920 ft, *CPD 1857* (RMA); on moist soil at margin of Potosi Creek underneath dense forest canopy, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2240* (RMA).

Brachytheciastrum velutinum var. *salicinum* (Schimper) Ochtyra & Żarnowiec

Uncommon; on wood, soil and rock with sparse forest canopy. Sporophytes common.

Plumas: on wood in ephemeral stream channel of Denton Creek with sparse forest canopy, two mi N of Graeagle, 2004, 5389 ft, *CPD 1472* (RMA); on rock underneath sparse forest canopy along unnamed tributary to Willow Creek, three mi NE of Graeagle, 2004, 5191 ft, *CPD & Toren 1703* (RMA); base of *Abies concolor*, six mi SW of Quincy, 2001, 5400 ft, *CPD 425* (UC – this specimen originally identified as *B. fendleri*).

Note: I have followed Ignatov (2014) by including *Brachythecium venustum* (De Notaris) with *Brachytheciastrum velutinum* var. *salicinum*.

Brachythecium acutum (Mitten) Sullivant

Rare; saturated peat soils. Single collection without sporophytes.

Plumas: raised spring mound at Oldhouse Fen about 10 mi NW of Portola, 2007, 5860 ft, *CPD 2404*, *Toren 9589a* (CAS, determined by Ignatov).

Note: This species was recently determined as new to California, after *California Mosses* was published by Malcolm et al. (2009). There are several other collections in the Sierra Nevada Mountains, so this species is not considered new to California by this study alone (J. Shevock personal communication 2014).

Brachythecium albicans (Hedwig) Bruch & Schimper

Common; on rock, duff and soils in forest environments. No collections with sporophytes.

Butte: on rock in ephemeral drainage to Flea Creek, two mi NE of Concow Reservoir, 2004, 2919 ft, *CPD & Toren 1817* (RMA). **Plumas:** on exposed rock outcrop along Stag Creek, four mi NW of Little Grass Valley Reservoir, 2002, 1704 m, *CPD & Gross 910* (UC); on dry rock outcrop near Grizzly Lake, two mi SW of Bucks Lake, 2003, 5220 ft, *CPD, Heep & Toren 1149* (RMA); on dry duff on stream bank along Long Valley Creek, 20 mi E of Quincy, 2005, 6370 ft, *CPD & Toren 2168* (RMA). **Sierra:** on rock outcrop at Little Rock Creek and Rock Creek confluence, six mi S of LaPorte, 2005, 3800 ft, *CPD 1898* (RMA). **Yuba:** on soil of eroded stream bank underneath dense forest canopy along Simon Ravine, 5.5 mi SW of LaPorte, 2005, 4120 ft, *CPD 1968* (RMA).

Brachythecium asperinum (Mitten. ex Müller Hal.) Sullivant

Rare, in small seepy drainage in mixed conifer forest.

Plumas: along Deanes Valley Rd (24N28) at Deer Creek, four mi W of Quincy, 1998, 4100 ft, *Janeway 5639* (MO, determined by M. Ignatov).

Brachythecium bolanderi (Lesquereux) A. Jaeger

Rare; on soil. No sporophytes in single collection examined.

Butte: on rotten wood in shaded riparian zone, six mi S of Paradise, Lime Saddle Marina Access Rd, 2011, 930 ft, *CPD 2690* (CAS). **Plumas:** bottom of deep shady canyon along Soda Creek, 0.7 mi NW of Hwy 70, 1998, 3100 ft, *Janeway 5581* (MO, determined by M. Ignatov). **Yuba:** on moist bare soil about five mi SE of Challenge, 2010, 2000 ft, *Toren 9736* (RMA).

Brachythecium erythrorrhizon Schimper

Uncommon; on streamside rock or wood underneath forest canopy. Sierra County collection without sporophytes.

Plumas: on moist shaded log near intermittent stream, four mi S of Bucks Lake, 2009, 5575 ft, *Toren 9715* (CAS, determined by Ignatov); on dry soil over rock, W of Four Trees, four mi SE of Cresta, 2009, 4500 ft, *Toren 9722* (CAS). **Sierra:** on rock near Potosi Creek underneath dense forest canopy, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2236* (RMA).

Brachythecium frigidum (Müller Hal.) Bescherele

Abundant; on rocks, wood or soil in seeps, springs, wet meadows and creeks, in full sunlight to dense shade. Sporophytes uncommon.

Butte: in standing water on litter under dense forest canopy, two mi S of Brush Creek community, 2002, 937 m, *CPD 826* (CAS). **Plumas:** submerged in stream under forest canopy in tributary to Lone Rock Creek, two mi W of Antelope Lake, 2002, 1720 m, *CPD & Gross 694* (CAS, UC); on moist soil in seep under partial forest canopy, three mi E of Moonlight Peak and 10 mi NE of Greenville, 2005, 5803 ft, *CPD & Toren 2183* (CAS); in dense mat of mosses in wet meadow, open canopy with willow stringer along South Fork Long Valley Creek, five mi E of Cromberg, 2004, 6074 ft, *CPD 1581* (CAS); on wet rocks on edge of Berry Creek, three mi NE of Quincy, 2004, 3500 ft, *Clifton B278* (CAS). **Yuba:** in moss dominated spring feeding into tributary to Slate Creek, four mi SW of LaPorte, 2005, 4200 ft, *CPD 1971* (CAS).

Brachythecium salebrosum (Hoffman ex F. Weber & D. Mohr.) Schimper

Rare; on forest floor. No sporophytes on single collection.

Plumas: on saturated soils at edge of meadow, eight mi NW of Antelope Lake, 2002, 2082 m, *CPD 1085* (UC); on old shreds of bark on forest floor, S side of Marion Ravine, 1998, 4800 ft, *Janeway 5702* (MO, determined by M. Ignatov).

Note: *Brachythecium salebrosum* is expected to be a forest floor species. Because *CPD 1085* was collected in a fen, it may instead be *B. mildeanum* (Schimp.) Schimp., an easily confused similar looking species. It should be reexamined.

Bruchia bolanderi Lesquereux

Uncommon; on seeping clay soils, in partial shade to full sunlight. Sporophytes rare.

Plumas: on moist soil bank of creek in Onion Valley, nine mi NE of LaPorte, 2001, 6221 ft, *Hanson 442* (RMA) and *Norris 83175* (UC); on clay soils at edge of seasonal drainage and near fen at Tamarack Flat, seven mi SW of Quincy, 2001, 5400 ft, *CPD, Hanson & Norris 399* (RMA, UC); on soils in permanent seep on road cut, eight mi SW of Quincy, 2001, 5380 ft, *CPD & Dittes 419* (UC); on seeping clay soil bank on down cut margin of Little Grizzly Creek, 16 mi E of Quincy, 2005, 5829 ft, *CPD & Friend 2179* (RMA); on wet clay bank where cattle hooves had scraped vascular plants away previous year in headwaters of Fall River, two mi W of Little Grass Valley Reservoir, 2002, 1685 m, *CPD 647* (UC).

Note: The Onion Valley site was the only collection with sporophytes, and is the only undisputable collection of the species in the study area. Norris, Toren, and the author believe that the sterile specimens are recognizable, but this is not a universal belief and this author is not certain of the identification. Other bryologists (personal communication B. Allen 2003 and Harpel 2004) have said the sterile specimens are unnamable.

Bryum argenteum Hedwig

Common; on concrete, dry rocks, disturbed soil, in urban areas in cracks in pavement; usually in full sun. Sporophytes uncommon.

Butte: on large granitic rock outcrop with sparse forest canopy, 1.5 mi W of Cresta, 2004, 3036 ft, *CPD & Toren 1729* (RMA); on moist granite rock underneath open forest canopy, at end of dirt rd from Shady Rest Area, 1 mi E of Cresta, 2006, 1700 ft, *CPD 2347* (RMA). **Plumas:** on crack in sidewalk in downtown Quincy, 2010, 3500 ft, *CPD 2654* (RMA); on mortar and rock around buildings in town of Storrie, 7.4 mi SW of Belden, 2011, 1771 ft, *CPD 2674* (CAS); on mortar and rock work in Feather River Canyon, 2.5 mi E of Belden, 2011, 2640 ft, *CPD 2662* (CAS, CHSC); around groups of rocks, N side of Last Chance Creek, 36 mi E of Quincy, 1998, 5880 ft, *Janeway 5677* (MO).

Bryum calobryoides J.R. Spence

Rare; on rock. Sporophytes unknown from county.

Plumas: on volcanic conglomerate rock outcrop with lime deposits on ridge above Jackson Creek, 1.5 mi SE of Cromberg, 2004, 5144 ft, *CPD 1689* (Spence personal herbarium, RMA); on exposed north-facing rock with snowmelt runoff, W of Onion Valley and nine mi NE of LaPorte, 2007, 6200 ft, *Toren 9600* (Spence personal herbarium).

Bryum lanatum (P. Beauvois) Bridel

Rare; in cracks in pavement, in full sun. Single collection without sporophytes.

Plumas: on crack in sidewalk in downtown Quincy, 2008, 3500 ft, *CPD 2441* (RMA).

Bucklandiella affinis (Schleicher ex F. Weber & D. Mohr) Bednarek-Ochyra & Ochyra

[*Racomitrium affine* (Schleicher ex F. Weber & D. Mohr) Lindberg]

Common; found on ephemerally moist soil or rock, sometimes seasonally submerged. Sporophytes common. **Butte:** on periodically moist granite slab at Big Bald Rock, three mi S of town of Brush Creek, 2003, 3270 ft, *Toren 9325* (CAS). **Plumas:** growing on rocky soil in dry intermittent draw, 12 mi NW of Quincy, 2002, 1585 M, *CPD & Gross 887* (UC, CAS). **Sierra:** on damp rock above Potosi Creek, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2244* (CAS). **Yuba:** on rock adjacent to Dry Creek, 1 mi S of Challenge, 2003, 2427 ft, *CPD 1207* (CAS).

Bucklandiella heterosticha (Hedwig) Bednarek-Ochyra & Ochyra

[*Racomitrium heterostichum* (Hedwig) Bridel]

Occasional on dry upland rocks and soil. Sporophytes uncommon.

Butte: on soil under forest canopy on ridge top near town of Brush Creek, 2002, 3234 ft, *CPD & Gross 540* (KRAM); on granite rock near town of Brush Creek, 2002, 2660 ft, *CPD 843* (CAS). **Plumas:** on rock outcrop along Tollgate Creek, four mi NE of Quincy, 2004, 4369 ft, *CPD 1401* (UC, KRAM, determined by Bednarek-Ochyra). **Yuba:** on open rock outcrop on cliff 2.5 mi E of Strawberry Valley and 27 mi E of Oroville, 2005, 3335 ft, *CPD 1954* (RMA).

Bucklandiella obesa (Frisvoll) Bednarek-Ochyra & Ochyra

[*Racomitrium obesum* Frisvoll]

Common; found on rock. Sporophytes common. **Butte:** on rock adjacent to Lockerman Creek, 19 mi E of Chico, 2004, 3140 ft, *CPD & Toren 1792* (CAS). **Plumas:** growing on granite rock, 12 mi NW of Quincy, 2002, 4000 ft, *CPD & Gross 895* (UC, CAS). **Sierra:** on rock near Gibson Creek, 5.5 mi northeast of LaPorte, 2005, 5608 ft, *CPD & Toren 2256* (KRAM); on rock at margin of Little Rock Creek, six mi S of LaPorte, 2005, 3800 ft, *CPD 1896* (CAS, KRAM, determined by Bednarek-Ochyra).

Bucklandiella pacifica (Ireland & J.R. Spence) Bednarek-Ochyra & Ochyra

Rare; on soil and rock. Specimens not examined for presence of sporophytes.

Butte: on shallow soil on granite rock above Lockerman Creek, 19 mi E of Chico, 2006, 3150 ft, *Toren 9482A* (CAS). **Yuba:** on shaded, intermittently seepy rock face at the E side of Slate Creek Bridge, two mi E of Strawberry Valley, 2006, 950 m, *Toren 9497* (CAS).

**Buxbaumia viridis* (De Candolle) Mougeot & Nestler
Rare; on rotten, moist old-growth log in old-growth forest. Considerable effort has been expended surveying for this species, therefore, the rare status is stronger than for some other species listed as rare in this catalogue. Sporophytes present on both collections.

Plumas: on rotten, wet, old-growth conifer log adjacent to French Creek, 1 mi N of Sly Creek Reservoir and

eight mi SW of LaPorte, 2009, 2980 ft, *CPD & Toren 2605* (CAS). **Yuba:** on rotten, barkless old-growth conifer log, one end in Brush Creek and in spray zone at bottom of perennial, 20-ft tall cascading waterfall, 2.5 mi E of Strawberry Valley, 2005, 3400 ft, *CPD 1948* (RMA, UC).

Campyllum chrysophyllum (Bridel) Lange.

Rare; on saturated wood in fen. Single collection without sporophytes.

Plumas: on log at edge of Silver Lake fen, 10 mi W of Quincy, 2001, 5900 ft, *CPD, Hanson & Norris 432* (RMA).

Note: Determined in 2001 by Norris and verified in 2009 by Toren and Dillingham, however the plant was collected in a fen, which appears to be somewhat inconsistent with typical habitats where the species is normally found.

Campyllum polygamum (Schimper) C.E.O. Jensen

Rare; on saturated soils in fen-like wetlands. No collections with sporophytes.

Plumas: on floating mat at Fowler Lake, three mi N of Little Grass Valley Reservoir, 2001, 5480 ft, *CPD, Hanson & Norris 412* (RMA); on saturated soils in fen-like wetland in full sunlight at headwaters of Taylor Creek, nine mi NE of Quincy, 2004, 6907 ft, *CPD & Toren 1663* (UC) and *CPD & Toren 1670* (CAS); floating in pond in Gray Eagle Valley, 1900, 6500 ft, *Leiberg 5468* (NY).

Note: *Leiberg 5468* was annotated as isotype of *Campyllum polygamum* var. *fluitans* by L. Hedenäs, 1995.

Campyllum stellatum (Hedwig) C.E.O. Jensen

Rare; in rich fen. No sporophytes on single collection.

Plumas: on spring mound in fen with pH of 8.3, named Alkali Fen, Last Chance Creek, seven mi N from Frenchman Lake, 2007, *Bishop s.n. 28 Aug 2007* (RMA).

**Campylopus introflexus* (Hedwig) Bridel

Rare: on disturbed soils. Single collection without sporophytes.

Yuba: on gravelly road shoulder, five mi SE of Challenge, 2010, 2000 ft, *Toren 9735* (CAS).

Note: this is thought to be an introduced species in the study area (Carter 2014a).

**Campylopus pyriformis* (Schultz) Bridel

Rare: on disturbed soils. Single collection without sporophytes.

Plumas: on mineral soil in spring with high sulfur content, eight mi NW of Quincy, 2011, 2840 ft, *CPD 2659* (CAS).

Note: This specimen, new for the Sierra Nevada Mountains, was determined by D. Toren and verified by J. Brinda and C. Dillingham in 2011. This species was recently excluded from California (Frahm 2007), but is included in other studies of California bryophytes (Norris and Shevock 2004a; Malcolm et al. 2009).

Ceratodon purpureus (Hedwig) Bridel

Abundant; on soil and soil over rock or wood, often in disturbed sites, and sites usually are dry in the summer. Sporophytes common.

Butte: on decomposed granitic soils underneath sparse forest canopy, 1.5 mi W of Cresta, 2004, 3036 ft, *CPD & Toren 1746* (RMA); on dry soil in 30-year-old *Pinus ponderosa* plantation 20 mi NE of Oroville, 2002, 1250 m, *CPD & Gross 1057* (UC). **Plumas:** on soil at trail

junction near Gold Lake in Bucks Lake Wilderness, 2001, 5819 ft, *CPD, Hanson & Norris 439* (CAS); on disturbed soil in grassy opening underneath sparse forest canopy, six mi E of Quincy, 2004, 3810 ft, *CPD 1259* (CAS). **Sierra:** on rock near stream at "Wink Eye Mine" underneath dense forest canopy along Potosi Creek, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2235* (CAS). **Yuba:** on roadside soils underneath moderate forest canopy, five mi SE of Challenge, 2003, 2220 ft, *CPD 961* (UC).

Claopodium bolanderi Best

Common on W side of study area; on soil, rock, wood and tree bases; underneath dense forest canopy. Sporophytes uncommon.

Butte: on soil at margin of Lockerman Creek, two mi NW of Cresta, 2004, 3140 ft, *CPD & Toren 1782* (CAS). **Plumas:** on rock above stream bank underneath moderate forest canopy, eight mi W of Quincy, 2002, 3980 ft, *CPD & Gross 896* (UC). **Sierra:** on silty soils underneath dense forest canopy near Gibson Creek, 5.5 mi NE of LaPorte, 2005, 5608 ft, *CPD & Toren 2260* (CAS). **Yuba:** on base of *Alnus rhombifolia* underneath dense forest canopy, five mi SW of LaPorte, 2005, 4060 ft, *CPD & Toren 1981* (CAS); on moist clay soil on bank of tributary stream to Slate Creek, 2.5 mi SE of Strawberry Valley, 2005, 3600 ft, *CPD 1926* (UC).

Claopodium crispifolium (Hooker) Renauld & Cardot

Rare on W side of study area; on wood under forest canopy. No sporophytes on single collection.

Sierra: on understory *Corylus* branch underneath 25% forest canopy adjacent to Little Rock Creek, six mi S of LaPorte, 2005, 3920 ft, *CPD 1874* (RMA).

Claopodium whippleanum (Sullivant) Renauld & Cardot
Common on W side of study area; on soil and creek banks; underneath dense forest canopy. No collections with sporophytes.

Butte: on soil adjacent to ephemeral tributary stream to Sucker Run Creek, four mi N of Forbestown, 2003, 2780 ft, *CPD 1398* (CAS, Harpel personal herbarium).

Plumas: on soil on bank of Rabbit Creek underneath dense forest canopy, 1/4 mi W of LaPorte, 2005, 4980 ft, *CPD & Toren 2025* (CAS). **Yuba:** on soil at edge of creek underneath dense forest canopy, three mi SE of Challenge, 2003, 2350 ft, *CPD 992* (CAS).

Codriophorus acicularis (Hedwig) P. Beauvois
[*Racomitrium aciculare* (Hedwig) Bridel]

Common; generally found in mesic situations and most often seasonally submerged rocks or soil along intermittent or permanent creeks. Sporophytes uncommon. **Butte:** mesic riparian zone, near town of Brush Creek, 2002, 3272 ft, *CPD 542* (UC). **Plumas:** growing on ephemerally submerged rocks in small creek, 1 mi W of Little Grass Valley Reservoir, 33 mi NE of Oroville, 2002, 1686 M, *CPD 906* (CAS, UC). **Sierra:** on rock in splash zone of Potosi Creek, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2243* (CAS). **Yuba:** on rock adjacent to Dry Creek, 1 mi S of Challenge, 2003, 2427 ft, *CPD 1206* (CAS).

Codriophorus depressus (Lesquereux) Bednarek-Ochyra & Ochyra
[*Racomitrium depressum* Lesquereux]

Common; found in mesic riparian zones, generally on ephemerally submerged rocks in stream channels. Sporophytes common. **Plumas:** in periodically inundated stream bed of Long Valley Creek, four mi E of

Cromberg, 2004, 5845 ft, *CPD 1573* (KRAM). **Sierra:** on damp rock above Potosi Creek, six mi E of LaPorte, 2005, 5438 ft, *CPD & Toren 2250* (CAS).

Cratoneuron filicinum (Hedwig) Spruce

Uncommon; on saturated soils in springs, wet meadows and fens at higher elevations. Sporophytes uncommon.

Plumas: on saturated soils at margin of creek flowing through meadow at Grassy Lake, Lakes Basin, six mi SW of Graeagle, 2001, 6320 ft, *CPD, Hanson & Norris 406* (CAS); at Johnsville, 1934, Ikenberry 1352 (MO); on exposed *Alnus incana* roots at edge of spring-fed headwater stream of Taylor Creek, nine mi NE of Quincy, 2004, 6826 ft, *CPD & Toren 1833* (CAS); on saturated soils in fen-like wetland at headwaters of Taylor Creek in full sunlight, nine mi NE of Quincy, 2004, 6907 ft, *CPD & Toren 1662* (CAS); on moist soil adjacent to spring-fed tributary to Long Valley Creek, 19 mi E of Quincy, 2005, 6196 ft, *CPD & Toren 2162* (CAS); on moist soil at edge of spring under dense forest canopy, three mi NE of Graeagle, 2004, 5050 ft, *CPD & Toren 1707* (CAS).

Crumia latifolia (Kindberg) W.B. Schofield

Rare; on wet, calcareous rocks or submerged in creeks. No collections with sporophytes.

Plumas: on ephemerally submerged sandstone bedrock in tributary to Middle Fork Feather River underneath open forest canopy, 2004, 4696 ft, *CPD & Toren 1720* (UC); on rock in calcareous seep on margin of Caribou Powerhouse Rd, 15 mi NW of Quincy, 2006, 3000 ft, *CPD, Kellman & Shevock 2354* (RMA).

Dendroalsia abietina (Hooker) E. Britton ex Brotherus
Abundant; on the bark of trees, usually hardwood, and on rock; underneath moderate to dense forest canopy or shaded rock recesses. Sporophytes common.

Butte: on recently fallen tree in Little Ram Creek, 1.5 mi N of Brush Creek community, 2002, 2920 ft, *CPD & Gross 1180* (CAS). **Plumas:** on shaded recess of rock boulder adjacent to unnamed tributary to Clear Creek, seven mi N of Quincy, 2004, 4780 ft, *CPD 1412* (CAS); on *Quercus kelloggii* adjacent to tributary to Taylor Creek, five mi NE of Quincy, 2004, 4329 ft, *CPD 1314* (CAS). **Sierra:** on bark of fallen *Acer macrophyllum* underneath dense forest canopy, six mi S of LaPorte, 2005, 3920 ft, *CPD 1891* (CAS). **Yuba:** on *Lithocarpus densiflorus* bole underneath dense forest canopy, 1 mi S of Challenge, 2003, 2520 ft, *CPD 1202* (CAS).

Dichodontium pellucidum (Hedwig) Schimper

Common; on seasonally submerged rocks along creeks and seeps; and uncommonly on wood. Sporophytes uncommon.

Butte: on saturated rock at edge of stream, two mi NW of Forbestown, 2003, 2070 ft, *CPD 1022* (RMA). **Plumas:** on log in stream, eight mi W of Quincy, 2002, 4000 ft, *CPD & Gross 892* (UC); on wet rock in headwaters of Dolly Creek, 16 mi E of Quincy, 2005, 6272 ft, *CPD, Toren & Friend 2050* (RMA); on rocks in deep shade near stream, Quincy, 1934, 3500 ft, Ikenberry 1015 (MO). **Sierra:** on saturated rock at edge of tributary to Rock Creek, five mi S of LaPorte, 2005, 4042 ft, *CPD 1932* (RMA). **Yuba:** on rock underneath 4-foot-tall waterfall in tributary to Canyon Creek, 3.5 mi E of Strawberry Valley, 2005, 3660 ft, *CPD 1911* (RMA).

Note: I have followed Eckel (2007) and have included *Dichodontium flavescens* (Dickson ex Withering) Lindberg with *Dichodontium pellucidum* for this work.

Dicranella rufescens (Withering) Schimper

Uncommon, on moist soil bank underneath partial forest canopy. Sporophytes common.

Plumas: on cutbank of near-vertical moist soil bank underneath partial shade of forest, 0.1 mi S of Bucks Lake, 2003, 5200 ft, *CPD & Toren 1134* (RMA); on soil bank underneath moderate forest canopy, two mi W of Little Grass Valley Reservoir, 2002, 1734 m, *CPD & Gross 813* (UC). **Sierra:** on moist vertical clay soils on eroded creek bank underneath sparse forest canopy, five mi NE of LaPorte, 2005, 5360 ft, *CPD & Toren 2262* (RMA).

Dicranoweisia cirrata (Hedwig) Lindberg ex Milde

Abundant; on dead wood and on the bases of conifers. Sporophytes common.

Butte: on cedar log underneath dense forest canopy, two mi W of Brush Creek, 2002, 2981 ft, *CPD 512* (UC). **Plumas:** on charred log along North Fork Feather River, 1947, Koch 1873 (UC); on rotting wood in riparian zone of Denten Creek, 1 mi NE of Graeagle, 2004, 4720 ft, *CPD & Miller 1369* (CAS). **Sierra:** on base of *Calocedrus decurrens* underneath dense forest canopy, five mi NE of LaPorte, 2005, 5240 ft, *CPD 2267* (CAS). **Yuba:** on base of *Pseudotsuga menziesii* underneath dense forest canopy, six mi SE of Challenge, 2003, 2740 ft, *CPD 949* (CAS).

Dicranoweisia crispula (Hedwig) Milde

Common; on either dry or wet rock underneath sparse to dense forest canopy. Sporophytes common.

Butte: on saturated rock in splash zone of tributary to Lake Oroville, two mi WNW of Forbestown, 2003, 2320 ft, *CPD 932* (UC). **Plumas:** on dry rock outcrop near edge of Fowler Lake, three mi N of Little Grass Valley Reservoir, 2001, 5480 ft, *CPD, Hanson & Norris 411* (CAS); on dry rock outcrop, five mi SW of Bucks Lake, 2003, 5188 ft, *CPD & Toren 1236* (CAS); on metamorphic rock, 1 mi W of LaPorte, 2005, 5369 ft, *CPD & Toren 2021* (CAS).

Note: I have followed Schofield (2007) and have included *D. contermina* Renauld & Cardot with *D. crispula* for this work.

* *Dicranum howellii* Renauld & Cardot

Uncommon; thus far found only on rock under dense canopy. Sporophytes unknown from study area. **Butte:** on dry rock under 90% canopy, 2.5 mi NE of Forbestown, 2003, 2700 ft, *CPD 1011* (CAS, MO, UC); on steep northwest-facing slope of large rock talus, on arm of Lake Oroville near Bloomer Hill, 2003, 290 M, Janeway 7745 (CHSC, UC). **Plumas:** on dry rock under forest canopy near Onion Creek, five mi NE of Strawberry Valley, 2005, 4225 ft, *CPD 2004* (CAS, UC).

Didymodon brachyphyllus (Sullivant) R.H. Zander

Rare, on rock. Sporophytes absent on single collection.

Plumas: on dry rock outcrop underneath sparse forest canopy, 2.5 mi NW of Graeagle, 2004, 5048 ft, *CPD 1491A* (MO, determined by Zander).

* *Didymodon eckeliae* R.H. Zander

Rare, from rock and concrete. Sporophytes absent on single collection examined.

Plumas: on vertical rock wall of open serpentine slope, along Caribou Rd, 3.3 mi E from Hwy 70, 2006, 2550 ft, *Shevock 28904* (CAS). **Yuba:** on sunny concrete water tank of old abandoned campground, five mi S of Challenge, 2010, 2300 ft, *Toren 9745* (MO).

Didymodon insulanus (De Notaris) M.O. Hill
[*Didymodon vinealis* var. *flaccidus* (Bruch & W.P. Schimper.) R.H. Zander]

Rare; on rock. No sporophytes on one collection examined.

Plumas: on saturated rock in stream channel of Denten Creek, 1.5 mi E of Graeagle, 2004, 5100 ft, *CPD 1374* (RMA); on rocks in Dixie Creek, 0.6 mi from Hwy 89, 1997, *Shevock, Ertter & Morosco 15729* (CAS).

Didymodon nicholsonii Culmann

Uncommon; on wet or dry rock. Sporophytes common. **Butte:** on thin soils shaded by rocks along ravine draining to North Fork Feather River Canyon at Rich Bar, 1998, 2750 ft, *Janeway 5420* (MO); rocky open serpentine slope, 3.3 mi up Caribou Rd from Hwy 70, 2006, 2550 ft, *Shevock 28904* (CAS).

Didymodon norrisii R.H. Zander

Locally common on E side of study area; on rock in ephemeral drainage zones in full sun. Sporophytes uncommon.

Plumas: on bedrock in ephemerally submerged portion of Denten Creek, 1.5 mi E of Graeagle, 2004, 5100 ft, *CPD & Miller 1373* (CAS); on volcanic conglomerate rock on S facing slope, three mi W of Cromberg, 2007, 4040 ft, *CPD & Toren 2386* (UC); on volcanic conglomerate rock outcrop in full sun, 16 mi E of Quincy, 2005, 6476 ft, *CPD & Toren 2156* (CAS); on vertical rock outcrop in sheet drainage area underneath sparse forest canopy, two mi N of Graeagle, 2004, 5048 ft, *CPD 1487* (MO).

Didymodon rigidulus Hedwig

Rare, on rock. Sporophytes absent on both collections. **Plumas:** on bedrock along ephemeral tributary to Greenhorn Creek, seven mi E of Quincy, 2004, 4040 ft, *CPD 1387* (CAS); on dry rock outcrop underneath sparse forest canopy, 2.5 mi NW of Graeagle, 2004, 5048 ft, *CPD 1491* (RMA).

Note: Both collections have rhizoidal clusters on adaxial side of leaf apex, which in Norris and Shevock (2004b) keys to *D. nicholsonii*. Zander, however, named these collections as *D. rigidulus*.

Didymodon tophaceus (Bridel) Lisa

Rare, on rock. Sporophytes absent on both collections. **Plumas:** on serpentine bedrock along unnamed spring in Feather River Canyon, 4.5 mi E of Belden, 2011, 2450 ft, *CPD 2661* (MO, determined by Zander); on travertine rock in spring, 1 mi W of Belden, 2011, 2223 ft, *CPD 2663* (CAS, determined by Brinda); on calcium influenced spring in Feather River Canyon, five mi E of Belden, 2011, 2627 ft, *CPD 2710* (CAS, determined by Slack).

Didymodon vinealis (Bridel) R.H. Zander

Common; on wet or dry rock or soil in full sun or underneath dense forest canopy. Sporophytes uncommon.

Butte: on wet crack in granite outcrop, two mi N of Brush Creek community, 2002, 2811 ft, *CPD 545* (UC); on vertical rock wall in pockets of collected soil adjacent to perennial creek, two mi NW of Forbestown, 2003,

1588 ft, *CPD 1093* (MO). **Plumas:** on wet rock in splash zone of 4-foot-tall waterfall along tributary to Cashman Creek, seven mi NE of Quincy, 2004, 5906 ft, *CPD 1422* (CAS). **Sierra:** on rock in splash zone of Little Rock Creek, six mi S of LaPorte, 2005, 3920 ft, *CPD 1885* (CAS).

Note: The species is variable within the study area. Zander has included specimens with bistratose margins (*CPD 1093*) and others with rhizoids growing from the costa in older leaves (*CPD 1408*, *CPD 1506* & *CPD 1510* [all at MO]) in his concept of *D. vinealis* from the study area.

Didymodon vinealis var. *rubiginosus* (Mitt.) R.H. Zander
Rare; no details on substrate on collection. Sporophytes present on only collection.

Plumas: at Indian Falls along Indian Creek, eight mi N of Quincy, 1955, 3200 ft, *Lawton 3133* (MO, determined by Lawton as synonym *Barbula rubiginosa* Mitt.).

Note: In Norris and Shevock (2004a) this species is listed as *D. occidentalis* R.H. Zander.

Ditrichum ambiguum Best

Rare; on soil. Sporophytes present on single collection.

Butte: on decomposed granitic soils on roadside cutbank underneath moderate forest canopy, 2.5 mi N of Pulga, 2004, 2941 ft, *CPD & Toren 1820* (UC).

Ditrichum heteromallum (Hedwig) E. Britton

Rare; on soil. Sporophytes unknown.

Yuba: on shaded damp bare soil on roadcut, North slope of Poverty Hill above Slate Creek, 2005, 4600 ft, *Toren 9414* (CAS).

Ditrichum montanum Leiberg

Uncommon; on soil. Sporophytes present on all collections.

Butte: on disturbed granitic soils of old roadbed in shade, three mi W of Cresta, 2005, 3500 ft, *Toren 9410* (RMA). **Plumas:** on dry soil at edge of stream in headwaters of Stag Creek, four mi NW of Little Grass Valley Reservoir, 2002, 5680 ft, *CPD & Gross 1242* (RMA, UC). **Yuba:** on damp clay soil, five mi SE of Challenge, 2010, 2140 ft, *Toren 9757* (RMA).

Ditrichum schimperi (Lesquereux) Kuntze

Rare; on soil. Sporophytes present on both collections.

Butte: on soil at Big Bald Rock, 15 mi NE of Oroville, 2005, 3200 ft, *Toren 9412* (RMA); on bare soil underneath sparse forest canopy, two mi E of Magalia, 2005, 3000 ft, *Toren, Hillaire & Lewis 9413* (RMA). **Yuba:** in old abandoned campground, five mi S of Challenge, 2010, 2300 ft, *Toren 9749* (CAS).

Drepanocladus aduncus (Hedwig) Warnstorf

Common; at higher elevations as a free floating aquatic or in saturated soils of fens, wet meadows, floating mats, ponds, springs and streams. No collections with sporophytes.

Plumas: on soil in wet meadow, seven mi N of Antelope Lake, 2001, 2047 m, *CPD 394* (CAS, Harpel personal herbarium); on floating mat at Fowler Lake, three mi N of Little Grass Valley Reservoir, 2001, 5480 ft *CPD, Hanson & Norris 413* (CAS); on saturated soil in Guest Fen, 14 mi SW of Quincy, 2003, 5080 ft, *Bishop 006* (CAS); on saturated soil in meadow, five mi N of Antelope Lake, 2002, 6600 ft, *CPD 1077* (CAS); submerged in small pond in meadow 1/2 mi W of Lake Davis, eight mi N of Portola, 2007, 5800 ft, *CPD 2392*

(CAS). **Sierra:** on saturated peat soils in McNair Meadow, three mi W of Calpine, 2003, 1613 m, *CPD* 902 (CAS, Harpel personal herbarium).

Drepanocladus polycarpon (Blandow ex Voit) Warnstorf
Uncommon at higher elevations; on peat soils or wood in fens and springs. No collections with sporophytes.

Plumas: on saturated soil in wet seep, eight mi NW of Antelope lake, 2002, 2047 m, *CPD* 1079 (RMA); on moist soil at edge of spring, three mi NE of Graeagle, 2004, 5050 ft, *CPD & Toren* 1696 (RMA); on saturated soils in fen-like wetland at the headwaters of Taylor Creek, nine mi NE of Quincy, 2004, 6907 ft, *CPD & Toren* 1665 (RMA); on saturated wood in fen-like wetland at Blakeless Spring, 15 mi E of Quincy, 2005, 6414 ft, *CPD & Toren* 2152 (RMA); on saturated soils in fen, 14 mi SW of Quincy, 2003, 5080 ft, *Bishop* 009 (CAS).

Note: Hedenäs (2014) did not discuss *D. polycarpon* in his treatment of North American species, but did include a discussion of *D. polycarpus*, which he included in his species concept of *D. aduncus* that may be relevant. I have chosen to follow Norris and Shevock (2004a, b) and recognize *D. polycarpon* at the species level due to the difference in the alar region between *D. polycarpon* and *D. aduncus*. Note that in Norris and Shevock (2004a, b) the taxon is misspelled as *D. polycarpus* (Shevock personal communication 2015). I follow the spelling listed in the Tropicos database.

Drepanocladus sordidus (Müller Hal.) Hedenäs

Uncommon at higher elevations; on peat soils or wood in fens and springs. No collections with sporophytes.

Plumas: on saturated soils in wet meadow along Willow Creek, downstream from Willow Lake, nine mi NE of Chester, 2000, 5800 ft, *Corbin* 971 (CAS, Lassen NF herbarium); on peat soils in Oldhouse Fen, 10 mi NW of Portola, 2007, 5860 ft, *CPD, Toren & Bishop* 2403 (CAS, Janssens personal herbarium).

Note: identification has been problematic and specimens have previously determined as other species including: *Drepanocladus aduncus* (Hedwig) Warnstorf (*CPD* 1079) and *Scorpidium scorpioides* (Hedwig) Limpricht (*Corbin* 971).

Encalypta ciliata Hedwig

Rare; on soil in rock crevice. Both collections with sporophytes.

Plumas: on soil in rock crevices above creek in Clarks Ravine, three mi S of LaPorte, 2005, 4700 ft, *Toren s.n.* (CHSC 110675); on soil on rocky cutbank in Feather River Canyon, 2.4 mi SW of Belden, 2011, 2116 ft, *Slack, Toren & Dillingham* 2667 (CAS).

Encalypta rhyptocarpa Schwägrichen

Rare; on soil. Sporophytes common.

Plumas: Hwy 89 about three mi S of Crescent Mills, *Norris* 69961 (determined by Horton); on dry granitic rock face on roadside cut underneath sparse forest canopy, five mi S of Antelope Lake and 13 mi SE of Janesville, 2005, 4677 ft, *CPD & Toren* 2199 (RMA).

Encalypta vulgaris Hedwig

Rare; on rock. Sporophytes present on single collection.

Plumas: on vertical, dry rock outcrop, 2.5 mi NW of Graeagle, 2004, 5048 ft, *CPD* 1490 (UC).

**Entosthodon attenuatus* (Dickson) Bryhn

Rare; on moist soil. Sporophytes on single collection.

Yuba: on moist soil, two mi S of La Porte Rd near Woodleaf, 2005, 2800 ft, *Toren* 9411 (CAS). Specimen had claret-colored rhizoids, which are unique to Northern Hemisphere *Entosthodon* species.

Note: This collection was determined with molecular work by Goffinet.

Epipterygium tozeri (Greville) Lindberg

Uncommon; on moist soil under dense forest canopy. Sporophytes uncommon.

Butte: on moist granitic soil along tributary to Jack Creek, two mi NE of Brush Creek community, 2003, 2920 ft, *CPD* 805 (UC, MO); on soil in splash zone of small 3-foot-tall waterfall along unnamed tributary to Lake Oroville, two mi NW of Forbestown, 2003, *CPD* 936 (UC). **Yuba:** on moist soil under dense forest canopy three mi SE of Challenge, 2003, 2350 ft, *CPD* 988 (UC, CAS).

Eucladium verticillatum (Withering) Bruch & Schimper

Rare; on moist calcareous rocks. Sporophytes present on one of two collections reviewed.

Plumas: on seepy limestone rock, along Hwy 70 near Belden, 1984, 4265 ft, *Norris* 69977 (UC); on rock in seep with calcium deposits, along North Fork Feather River Trail upriver from Caribou Powerhouse, 15 mi NW of Quincy, 2006, 3000 ft, *CPD & Miller* 2342 (CAS) and further up same trail in similar habitat *CPD & Miller* 2343 (CAS).

Eurhynchium pulchellum (Hedwig) Jennings

Common at moderate to higher elevations; on soil or soil over rock underneath moderate to dense forest canopy. Sporophytes uncommon.

Plumas: on dry rock outcrop, two mi SW of Bucks Lake, 2003, 5220 ft, *CPD, Toren & Heep* 1150 (CAS); on moist soil at edge of tributary to Cascade Creek, 13 mi E of Quincy, 2005, 6253 ft, *CPD & Toren* 2082 (CAS). **Sierra:** on moist organic soil on stream bank of Gold Run Creek, five mi SW of LaPorte, 2005, 4100 ft, *CPD & Toren* 1992 (CAS); on clay soil at margin of tributary to Gold Run Creek, five mi SW of LaPorte, 2005, 4570 ft, *CPD & Toren* 2000 (UC); on moist soil under dense forest canopy along Potosi Creek, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren* 2239 (CAS).

Fabronia pusilla Raddi

Rare; single collection on bark of oak.

Butte: on trunk of *Quercus wislizenii* in full shade near Elephant Dome, Feather River Canyon, 2011, 1550 ft, *Wishner* 12281 (RMA).

Fissidens bryioides Hedwig

Common; mostly on wet soil (especially clay) and also occasionally on saturated wood or rocks in stream channel, usually shaded. Sporophytes uncommon.

Butte: on saturated wood in tributary to Berry Creek, two mi S of Brush Creek community, 2002, 834 m, *CPD & Gross* 831 (UC); on wet soil in splash zone of unnamed tributary to Lake Oroville, two mi WNW of Forbestown, 2003, 2320 ft, *CPD* 938 (RMA). **Plumas:** on moist clay soils on margin of tributary to Spanish Creek, 1 mi W of Keddie, 2004, *CPD* 1682 (CHSC). **Sierra:** on moist mineral soils in tributary to Slate Creek, 2.5 mi NE of LaPorte, 2005, 5080 ft (highest elevation collection for *Fissidens* on Plumas NF), *CPD* 2311 (RMA). **Yuba:** on moist clay soil in headwaters of Little Oregon Creek, two mi S of Challenge, 2003, 2660 ft, *CPD* 999 (UC).

Fissidens crispus Montagne

Common; on moist shaded soil and rocks of creeks and road banks. Sporophytes uncommon.

Butte: on moist soil adjacent to Ram Creek, two mi NE of Brush Creek community, 2002, 2980 ft, *CPD & Gross 1161* (UC). **Plumas:** on bank of tributary to Meadow Valley Creek, eight mi E of Quincy, 2002, 4020 ft, *CPD & Gross 665* (UC); on creek bank E of Concow, 1999, 2840 ft, *Janeway 6440* (CHSC, MO) (determined by Whittemore as synonym *F. limbatulus*). **Yuba:** on ephemeral moist clay soils under dense canopy, 1/4 mi W of new Bullards Bar Reservoir and five mi SE of Challenge, 2003, 2500 ft, *CPD 955* (UC).

Fissidens grandifrons Bridel

Rare; on rock, submerged in creeks and springs. Kellman (2003) indicates usually, but not always calcareous. Sporophytes unknown from study area.

Plumas: on rock in cascading creek immediately W of Caribou Powerhouse, 15 mi NW of Quincy, 2006, 3000 ft, *CPD, Shevock & Kellman 2353* (CHSC, UC); on rock in spring uphill from North Fork Campground, 16 mi W of Quincy, 2009, 3133 ft, *Friend s.n. 31 Oct 2009* (CAS); at campsite along Hwy on North Fork Feather River, 1947, *Koch 1893* (MO).

**Fissidens pauperculus* M. Howe

Rare; on moist streamside soils under dense canopy. Sporophytes unknown from county.

Butte: on moist clay soils adjacent to tributary to Ponderosa Reservoir, 1.5 mi NW of Forbestown, 2003, 2620 ft, *CPD 929* (CAS); on clay stream bank near Watson Ridge, four mi ESE of Brush Creek community, 2002, 3360 ft, *CPD & Gross 779* (Harpel personal herbarium, UC).

Fissidens sublimbatus Grout

Uncommon, poor soils that dry in summer. Sporophytes common.

Butte: on ultramafic clay soils with 5% canopy of *Pinus sabiniana* and *Ceanothus cuneatus*, two mi NE of Concow Reservoir and 16 mi E of Chico, 2004, 2849 ft, *CPD & Toren 1819* (RMA); on rocky soils of road cut along Pulga Rd, five mi SW of Cresta, 2011, 1500 ft, *CPD 2655* (RMA). **Yuba:** on soil in root wad sinkhole, seven mi SSE of community of Woodleaf, 2010, 2600 ft, *Toren s.n. 11 May 2010* (RMA).

Fissidens ventricosus Lesquereux

Common; on rocks either submerged in creeks or in the splash zone of small waterfalls and cascades. Sporophytes uncommon.

Butte: on rock in cascade of tributary stream to Ponderosa Reservoir, 1.5 mi NW of Forbestown, 2003, 2800 ft, *CPD 930* (RMA); on rock in Martin Creek, 1 mi SW of Brush Creek, 2002, 2700 ft, *CPD 844* (CAS). **Plumas:** on rock in splash zone of 1-foot-tall waterfall, four mi WSW of Portola. **Sierra:** on submerged rock in Morris Ravine, five mi SE of LaPorte, 2005, 4200 ft, *CPD & Toren 2318* (RMA). **Yuba:** on shallowly submerged rock in tributary to Dry Creek, 1 mi S of Challenge, 2003, 2520 ft, *CPD 1194* (UC).

Fontinalis antipyretica Hedwig

Uncommon, submerged aquatic, underneath moderate to dense canopy. No collections with sporophytes.

Plumas: attached to wood in intermittent stream, four mi N of Antelope Lake, 2002, 1820 m, *CPD 669* (UC).

Sierra: submerged in rapidly flowing little Rock Creek underneath dense forest canopy, six mi S of LaPorte, 2005, 3920 ft, *CPD 1886* (RMA). **Yuba:** submerged in tributary to Diamond Ravine, three mi E of Strawberry Valley, 2005, 3729 ft, *CPD 1929* (RMA).

Fontinalis howellii Renaud & Cardot

Rare, submerged aquatic. No collections with sporophytes.

Plumas: on edge of Fowler Lake, three mi N of Little Grass Valley Reservoir, 2001, 5480 ft, *CPD, Hanson & Norris 410* (RMA).

Note: Determined in 2001 by Norris and verified in 2009 by Toren and Dillingham.

Fontinalis mollis Müller Hal.

Uncommon, submerged aquatic, underneath moderate to dense canopy. Neither collection with sporophytes.

Sierra: submerged on rock in center of stream, three mi NW of Calpine, 2002, 1614 m, *CPD 632* (Harpel personal herbarium, RMA); in dried out stream bed, about 1/4 mi downstream from *CPD 632* collection locality, 2002, 1604 m, *CPD 634* (UC).

Fontinalis neomexicana Sullivant & Lesquereux

Common, submerged aquatic, often attached to rock. No collections with sporophytes.

Butte: submerged in tributary to Fall River, 20 mi NE of Oroville, 2002, 4034 ft, *CPD 924* (UC); attached to rocks, submerged in Lockerman Creek, two mi NW of Cresta, 2004, 3140 ft, *CPD & Toren 1772* (RMA).

Plumas: submerged in remnant pool of ephemeral stream, two mi W of Little Grass Valley Reservoir, 2002, 5380 ft, *CPD & Gross 920* (UC); submerged in Pierce Creek, five mi W of Thompson Peak, 2002, 1943 m, *CPD 1087* (UC). **Yuba:** submerged in tributary to Dry Creek, 1 mi S of Challenge, 2003, 2520 ft, *CPD 1198* (RMA); submerged in tributary to Gold Run Creek, five mi SW of LaPorte, 2005, 4360 ft, *CPD 1976* (RMA).

Frisvollia varia (Mitten) Sawicki, Szczecińska, Bednarek-Ochyra & Ochyra

[*Racomitrium varium* (Mitten) A. Jaeger; *Codriophorus varius* (Mitten) Bednarek-Ochyra & Ochyra]

Uncommon; usually on dry rock underneath sparse to dense forest canopy. Sporophytes uncommon.

Butte: on dry rock in riparian zone, two mi NW of Forbestown, 2003, 2320 ft, *CPD 933* (CAS, Harpel personal herbarium); on granite outcrop near town of Brush Creek, 2002, 2903 ft, *CPD 524* (UC); on base of large granitic outcrop, 2004, 3036 ft, *CPD & Toren 1742* (CAS, KRAM). **Plumas:** on dry rock outcrop four mi NE of Quincy, 2004, 4121 ft, *CPD 1301* (CAS, KRAM, determined by Bednarek-Ochyra).

Note: I have followed Sawicki et al. (2015) and recognize the new genus *Frisvollia* Sawicki, Szczecińska, Bednarek-Ochyra & Ochyra to accommodate *F. varia* (Mitt.), a species that has recently been placed in *Codriophorus* as *C. varius* (Mitt.) Bednarek-Ochyra & Ochyra.

Funaria hygrometrica Hedwig

Common; on disturbed moist soil, especially in areas with charcoal. Sporophytes almost always present.

Plumas: on small log in fen-like wetland at Little Summit Lake, 17 mi E of Quincy, 2005, 5813 ft, *CPD 2112* (RMA); on charcoal soils adjacent to Denten Creek, 1 mi E of Graeagle, 2004, 4700 ft, *CPD & Miller 1363*

(RMA). **Sierra:** on bare soils with charcoal adjacent to Rock Creek underneath moderate forest canopy. **Yuba:** on charcoal soils, five mi SE of Challenge, 2003 2240 ft, *CPD 968* (UC).

Gemmabryum badium (Bridel) J.R. Spence

Rare; on thin soil in exposed site. Single collection without sporophytes.

Plumas: on thin crust of dry soil on an exposed rock outcrop in a coniferous forest, eight mi W of Quincy, 2003, 4240 ft, *CPD 926* (Spence personal herbarium, UC).

Gemmabryum barnesii (J.B. Wood ex Schimper) J.R. Spence

Rare; on thin soil over rock. Sporophytes on single collection.

Plumas: on thin decomposed granitic soil over rock, W of Tobin Bridges over Hwy 70, six mi SW of Belden, 2011, 1988 ft, *CPD 2670* (RMA, determined by Spence, Slack and Toren).

Gemmabryum brassicoides J.R. Spence & Kellman

Rare; on rock in full sunlight. No collections with sporophytes.

Plumas: on exposed rock outcrop in Stag Creek drainage, four mi NW of Little Grass Valley Reservoir, 2002, 1715 m, *CPD & Gross 916* (Spence personal herbarium); on rocky stream bank under open forest canopy adjacent to tributary to Middle Fork Feather River, 1.5 mi E of Graeagle, 2004, 4603 ft, *CPD & Toren 1724* (RMA, Spence personal herbarium).

Note: This is a recently described species (Spence and Kellman 2015). J. Spence verified these two specimens. The species is characterized by having concave and ovate leaves with a short excurrent costa, and gemmiform stems.

Gemmabryum caespitium (Hedwig) J.R. Spence

Rare; on thin soil in rock crevices. Sporophytes on both collections.

Plumas: on thin soil over rock, near Pilot Peak, 1 mi W of Onion Valley, 2009, 6000 ft, *Toren s.n. 23 June 2009* (RMA, determined by Toren and Harpel); on disturbed moist soil in middle of 100-acre Walker Mine copper mine tailings, 15 mi E of Quincy, 2005, 5760 ft, *CPD, Toren & Friend 2063* (RMA, Spence personal herbarium).

Note: This species is difficult for me to identify and I generally have undercollected this group. Therefore it may be more common than collections currently suggest. Spence has suggested it to be a common species (personal communication 2014).

Gemmabryum dichotomum (Hedwig) J.R. Spence & H.P. Ramsay

Rare; on rock. No sporophytes on single collection.

Plumas: on rock in seep in roadside opening in forest near headwaters of Dolly Creek, 16 mi E of Quincy, 2005, 6272 ft, *CPD, Toren & Friend 2044* (Spence personal herbarium).

Note: includes *Bryum bicolor* Dickson.

Gemmabryum vinosum J.R. Spence & Kellman

Rare; on rock or soil over rock in full sun. No sporophytes on collection.

Plumas: on dry rock out crop with sparse canopy cover, adjacent to tributary to Greenhorn Creek, seven mi E of Quincy, 2004, 4040 ft, *CPD 1394* (UC, Spence).

Note: The recent description of this species (Spence and Kellman 2015) includes *CPD 1394* as a paratype specimen. It is characterized by forming dense tufts of strongly reddish leaves, with short, ovate leaves and a short excurrent costa that is often hyaline.

Gemmabryum violaceum (Crundwell & Nyholm) J.R. Spence

Rare; on rock. Single collection without sporophytes.

Plumas: on dry rock outcrop of conglomerate volcanic tuff underneath open *Abies magnifica* canopy in the headwaters of Cascade Creek, 13 mi E of Quincy, 2005, 6669 ft, *CPD 2076* (Spence personal herbarium).

Grimmia alpestris (F. Weber & D. Mohr) Schleicher

Common, on exposed rock. Sporophytes common.

Plumas: on rock near Silver Lake, Bucks Lake Wilderness, 2001, 5900 ft, *CPD 436* (RMA); on large dry rock, in Stag Creek drainage, four mi NE of Little Grass Valley Reservoir, 2002, 5640 ft, *CPD & Gross 908* (UC); on rock six mi WNW of LaPorte, 2001, 5240 ft, *CPD 1062* (RMA); in crevices of shaded serpentine rock near Pilot Peak, 2007, 6300 ft, *Toren 9599* (CAS, determined by Hastings).

Grimmia anomala Hampe ex Schimper

Common on dry rock underneath moderate to dense forest canopy; generally above 5000 ft elevation. No collections with sporophytes; apical leaf gemmae common.

Plumas: on shaded granite rock outcrop near outlet to Gold Lake, Bucks Lake Wilderness, 11 mi W of Quincy, 2001, 5852 ft, *CPD, Hanson & Norris 1190* (UC); at Onion Valley, 10 mi NE of LaPorte, 2001, 6220 ft, *Norris 83187* (UC); on shaded rock in Grizzly Creek riparian zone, two mi SW of Bucks Lake, 2004, 5090 ft, *CPD, Toren & Friend 1562* (RMA); on rock outcrop underneath dense forest canopy, 1/4 mi W of LaPorte, 2005, 5275 ft, *CPD & Toren 2026* (RMA). **Sierra:** on boulder near Gibson Creek underneath dense forest canopy, 5.5 mi NE of LaPorte, 2005, 5608 ft, *CPD & Toren 2255* (RMA).

Grimmia brevirostris R.S. Williams

Rare; on exposed rock outcrops. Sporophytes common.

Plumas: "Buck's Ranch" (lectotype), 1900, 6500 ft, *Leiberg 5445*, (NY); on dry granite boulders in Granite Basin, three mi N of Bucks Lake, 2013, 5600 ft, *CPD 2742* (CAS, this specimen lacks peristome teeth).

Note: This species was known only from the type specimen and early workers in *Grimmia* assumed that it was the same as *Grimmia hamulosa* Lesquereux, which is the earlier published name. It continued to be included in *G. hamulosa* through the Flora of North America project (Hastings and Greven 2007). However, recent fieldwork by Hastings, Toren, Shevock and Dillingham in Plumas County revealed that both taxa are in fact distinct although they can occur together and occupy the same type of habitat, they are separated by several gametophytic and sporophytic characters. The type specimen of *G. brevirostris* (NY) was also examined by Hastings and the Granite Basin plants match the type specimen. This species is different from typical *Grimmia hamulosa* in the following ways: the outer peristome teeth have longitudinal striations, the costa is more narrow, it has a more narrow leaf apex with shoulders on the leaves and has awns rather than mucous leaves and

straight rather than falcate leaves (R. Hastings personal communication 2013).

Grimmia hamulosa Lesquereux

Uncommon; on exposed rock outcrops, generally above 5000 ft elevation. Sporophytes common.

Plumas: on granite rock outcrop near Gold Lake in Bucks Lake Wilderness, 11 mi W of Quincy, 2001, 5819 ft, *CPD*, *Hanson & Norris 417* (RMA); on large exposed rock, in Stag Creek drainage, four mi NE of Little Grass Valley Reservoir, 2002, 1740 m (5640 ft), *CPD & Gross 915* (UC); on large and dry rock outcrop, 11 mi E of Quincy, 2005, 6914 ft, *CPD 2117* (RMA).

Grimmia laevigata (Bridel) Bridel

Uncommon; on dry, exposed rock outcrops. No collections with sporophytes.

Butte: on large granitic rock outcrop, 1.5 mi W of Cresta, 2004, 3036 ft, *CPD & Toren 1739* (CAS); on dry, upland serpentinite rock underneath sparse forest canopy, two mi E of Concow Reservoir, 2004, 3010 ft, *CPD & Toren 1803* (CAS); on dry serpentinite rock, 12 mi E of Chico, 2004, 3054 ft, *CPD & Toren 1826* (CAS); on volcanic rocks, North Table Mountain, *Ahart 10033* (CAS). **Plumas:** on dry, 40-foot-tall rock outcrop in manzanita shrub field, four mi NE of Quincy, 2004, 4363 ft, *CPD 1307* (CAS); on volcanics, E side of Sierra Valley, *Laeger 1076* (CAS).

Note: Fernandez et al. (2006) found molecular differences forming two clades within this species in California. *CPD 1307*, *CPD & Toren 1739*, *1803 & 1826* were within Clade two while *Laeger 1076* and *Ahart 10033* were within Clade 1. Whether or not these two clades form cryptic species within the taxon currently known as *G. laevigata* requires worldwide sampling and further study.

Grimmia leibergii Paris

Rare; on rock. Neither collection with sporophytes.

Plumas: along Berry Creek drainage, three mi NE of Quincy, 2004, 3500 ft, *Clifton B274* (RMA); on metamorphic rocks in a *Quercus chrysolepis* woodland under partial shade, along North Fork Feather River Trail off of Caribou Rd, eight mi above Hwy 70, 2006, 3025 ft, *Shevock 28926* (CAS). **Yuba:** on rock outcrop underneath moderate forest canopy, two mi E of Strawberry Valley, 2005, 2680 ft, *CPD 1848* (RMA).

Grimmia lisae De Notaris

Rare; on ephemeral wet rocks. No sporophytes on single collection examined.

Butte: in ephemeral drainage area leading to Rattlesnake Creek underneath sparse forest canopy, 12 mi E of Chico, 2004, 3098 ft, *CPD & Toren 1823* (RMA). **Plumas:** on sunny exposed granite boulder at high water mark of river, Feather River Canyon below Historic Storrie Bridge, 2006, 1775 ft, *Shevock 28920* (CAS).

Grimmia montana Bruch & Schimper

Common; on dry rock. Sporophytes common.

Butte: on granitic rock outcrop, 1.5 mi W of Cresta, 2004, 3036 ft, *CPD & Toren 1738* (RMA). **Plumas:** on dry volcanic conglomerate rock outcrop, 13 mi E of Quincy, 2005, 6452 ft, *CPD 2103* (RMA). **Sierra:** on rock adjacent to Rock Creek underneath sparse forest canopy, five mi S of LaPorte, 2005, 4042 ft, *CPD 1937* (RMA).

Grimmia ovalis (Hedwig) Lindberg

Rare; on rock with seeps.

Butte: on massive granitic rock slabs and rock walls with seeping water along Hwy 70 just E of Arch Rock in open *Quercus chrysolepis* woodland, 1 mi E of Cresta, 2006, 1575 ft, *Shevock 28912* (CAS).

Grimmia pulvinata (Hedwig) Smith

Common; on rock or concrete, associated with calcium. Sporophytes common.

Plumas: on rock in disturbed opening, six mi E of Quincy, 2004, 3810 ft, *CPD 1245* (RMA); on rock outcrop in riparian zone underneath moderate forest canopy, 1.5 mi E of Graeagle, 2004, 4750 ft, *CPD & Toren 1717* (UC); on cement at upstream end of Caribou Powerhouse along East Branch of North Fork Feather River, 15 mi NW of Quincy, 2006, 3000 ft, *CPD*, *Kellman & Shevock 2355* (RMA); on rock in *Purshia tridentata* opening in pine forest, 1.5 mi NW of Cromberg, 2007, 4680 ft, *CPD & Toren 2385* (RMA). **Yuba:** on concrete bridge abutment, five mi SE of Challenge, 2010, 2000 ft, *Toren 9739* (RMA).

Grimmia ramondii (Lamarck & de Candolle) Margadant

Common; on wet or dry rock, generally underneath dense forest canopy. Sporophytes uncommon.

Plumas: on granite rock outcrop adjacent to Gold Lake, 11 mi W of Quincy, 2001, 5819 ft, *CPD*, *Hanson & Norris 415* (RMA); on rock underneath dense forest canopy on Rock Island Ridge, 13 mi W of Quincy, 2004, 5052 ft, *CPD 1600* (RMA); on rock adjacent to Poplar Creek, four mi SW of Cromberg, 2007, 4880 ft, *CPD & Toren 2372* (RMA). **Sierra:** on saturated rock in headwater tributary to Gold Run Creek, five mi SW of LaPorte, 2005, 4570 ft, *CPD & Toren 1997* (RMA); on dry boulder underneath dense forest canopy, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2247* (RMA).

Grimmia serrana J. Muñoz, Shevock & D.R. Toren

Rare; on rock. Sporophytes common.

Butte: on large granitic rock outcrop at Big Bald Rock, three mi SE of Brush Creek community, 2004, 3270 ft, *Toren s.n.* (CAS). **Plumas:** on large granitic rock outcrop, 18 mi E of Chico, 2004, 3036 ft, *CPD & Toren 1741* (UC).

Grimmia torquata Drummond

Uncommon; on rock, often growing on shaded cliffs or under moderate to dense forest canopy. No collections with sporophytes.

Plumas: on vertical rock cliff in narrow ravine in spray zone of waterfall along Clark's Ravine, 29 mi E of Oroville, 2005, 4050 ft, *CPD 2037* (UC); on dry rock underneath partial forest canopy in narrow canyon of East Branch North Fork Feather River, 15 mi NW of Quincy, 2006, 3000 ft, *CPD*, *Kellman & Shevock 2356* (RMA). **Sierra:** on shaded 30-foot-tall slate rock cliff under moderate forest canopy, five mi NE of LaPorte, 2005, 4950 ft, *CPD 2266* (UC); on rock underneath dense forest canopy adjacent to tributary to Cedar Grove Ravine, 3.5 mi E of LaPorte, 2005, 4912 ft, *CPD & Toren 2280* (RMA).

Grimmia trichophylla Greville

Common; the most common *Grimmia* in the study area. On dry rocks in a variety of habitats. Sporophytes common.

Butte: on decomposed granite outcrop, 1 mi NE of Brush Creek community, 2002, 2908 ft, *CPD 531* (UC); on dry rock in riparian zone along tributary to Lake Oroville, two mi WNW of Forbestown, 2003,

2320 ft, *CPD* 937 (RMA); on dry, upland serpentinite rock outcrop, 16 mi E of Chico, 2004, 3010 ft, *CPD & Toren 1804* (RMA – note that David Toren lost a bet for a bottle of Arrogant Bastard Ale on his *G. lisae* field determination on this collection). **Plumas:** on granite rock near Silver Lake, 11 mi W of Quincy, 2001, 5900 ft, *CPD, Hanson & Norris 433* (RMA); on dry rock outcrop adjacent to Denten Creek, 1 mi E of Graeagle, 2004, 4700 ft, *CPD & Miller 1355* (RMA). **Sierra:** on rock outcrop underneath dense forest canopy, six mi S of LaPorte, 2005, 3800 ft, *CPD 1899* (RMA). **Yuba:** on rock outcrop underneath dense old-growth forest canopy, five mi SW of LaPorte, 2005, 4060 ft, *CPD & Toren 1985* (RMA).

Hedwigia detonsa (M. Howe) W.R. Buck & D.H. Norris
Uncommon; on dry rock. Collections without sporophytes.

Butte: on dry, ultramafic-derived rock underneath sparse forest canopy 12 mi E of Chico, 2004, 3143 ft, *CPD & Toren 1827* (UC); on massive granitic rock in Feather River Canyon immediately E of Arch Rock, 2006, 1575 ft, *Shevock 28913* (CAS). **Plumas:** on rock on margin of road before Caribou Powerhouse, 15 mi NW of Quincy, 2006, 3000 ft, *CPD, Kellman & Shevock 2362* (RMA).

Hedwigia stellata Hedenäs

Rare on dry rock. Single collection with sporophytes.

Butte: on granitic rock outcrop on road cut at milepost 46.0 on Hwy 70, 0.4 mi W of Bear Creek and 10 mi NE of Paradise, 2009, 1500 ft, *CPD 2556* (CAS).

Homalothecium aeneum (Mitten) E. Lawton

Common; on dry, or sometimes wet, rock. Sporophytes uncommon.

Plumas: on rock in splash zone of tributary to Greenhorn Creek, six mi E of Quincy, 2004, 3750 ft, *CPD 1272* (RMA). **Sierra:** on rock outcrop at Little Rock Creek and Rock Creek confluence, six mi S of LaPorte, 2005, 3800 ft, *CPD 1901* (RMA).

Homalothecium aureum (Spruce) H. Robinson

Uncommon; on soil or rocks. Sporophytes present on single collection examined.

Butte: no collection data, 1934, *Koch 1203* (MO); 14 mi E of Chico, 1933, *Ikenberry 1552* (MO). **Plumas:** near edge of Berry Creek, three mi NE of Quincy, 2004, 3500 ft, *Clifton B280* (RMA); on metamorphic rock near Butterfly Valley, six mi NW of Quincy, 1997, 1000 m, *Shevock, Ertter & Morosco 15738* (CAS).

Note: all of these collections were determined as *H. pinnatifidum* (Sullivant) E. Lawton, but I am including them as *H. aureum* to follow Ignatov (2014).

Homalothecium californicum Hedenäs, Huttunen, Shevock & D.H. Norris

Common; on rock in mesic habitats. No collections with sporophytes.

Butte: on north-facing moist granitic rock along Hwy 70 at milepost 46.0, 10 mi NE of Paradise, 2009, 1500 ft, *CPD 2554* (CAS). **Plumas:** on rock outcrop in mesic riparian zone, four mi E of East Quincy, 2004, 3750 ft, *CPD 1276* (RMA); along E branch North Fork Feather River near Caribou, 15 mi NW of Quincy, 2006, 3000 ft, *Kellman, Shevock and Dillingham 5133* (CAS). **Sierra:** on exposed rock cliff above Potosi Creek, six mi E of LaPorte, 2005, 5438 ft, *CPD 2251* (RMA); on slate bedrock adjacent to Cedar Grove

Ravine Creek, three mi E of LaPorte, 2005, 4745 ft, *CPD 2284* (RMA).

Note: The *Kellman, Shevock and Dillingham 5133* collection was included as an additional specimen examined in the description of this species (Hedenäs et al. 2012).

* *Homalothecium megaptilum* (Sullivant) H. Robinson
Rare; thus far found only on dry forest duff over soil. Sporophytes unknown from study area.

Plumas: on dry forest duff over soil in Meadow Valley, four mi NW of Quincy, 2003, 4350 ft, *CPD 925* (CAS, UC). Specimen was verified by Schofield, Toren and Shevock. **Yuba:** on shaded conifer duff, 1/2 mi S of community of Woodleaf, 2010, 3120 ft, *Toren & Simenc 9766* (RMA); on shady mesic soil, 3.2 km S of Woodleaf, 2012, 783 m, *Janeway & Williams 10795* (CAS).

Note: This was cited in Norris and Shevock (2004a) as *Trachybryum megaptilum* (Sullivant) W.B. Schofield but is now placed in *Homalothecium* (Ignatov 2014).

Homalothecium nevadense (Lesquereux) Renauld & Cardot

Common; on rock or sometimes on wood and bases of trees. Sporophytes common.

Plumas: on granite boulder under dense forest canopy, two mi W of Antelope Lake, 2002, 1720 m, *CPD 695* (UC); on ephemerally submerged roots of *Alnus rhombifolia* along tributary to Greenhorn Creek, five mi SE of Quincy, 2004, 3770 ft, *CPD 1269* (UC); on dry rock outcrop, two mi SW of Bucks Lake, 2003, 5220 ft, *CPD, Toren & Heep 1155* (RMA); on dry rock outcrop, 12 mi E of Quincy, 2005, 6042 ft, *CPD 2070* (RMA).

Homalothecium nuttallii (Wilson) A. Jaeger

Common; on base of hardwoods and *Taxus brevifolia*, sometimes on rock or cement. Sporophytes uncommon.

Butte: on base of *Alnus rhombifolia*, underneath dense forest canopy, 1/2 mi NW of Brush Creek community, 2002, 3057 ft, *CPD 518* (UC, Harpel). **Plumas:** on concrete culvert face above stream channel of Denten Creek, 1 mi NE of Graeagle, 2004, 4720 ft, *CPD & Miller 1365* (RMA). **Sierra:** on *Taxus brevifolia* underneath dense forest canopy, six mi S of LaPorte, 2005, 3920 ft, *CPD 1881* (RMA). **Yuba:** on base of *Arbutus menziesii* underneath moderate forest canopy, five mi SE of Challenge, 2003, 2240 ft, *CPD 971* (UC).

Hygroamblystegium varium (Hedwig) Mönkemeyer var. *varium*

Rare; on rock and old mortar. One collection with sporophytes.

Plumas: on exposed canyon walls with seeping water, Feather River Canyon 1 mi W of Belden, 1997, 800 m, *Shevock, Ertter & Morosco 15743* (CAS); on rocks in cascading streamlet, Feather River Canyon near Rock Creek, 2006, 1735 ft, *Shevock 28919* (CAS); Feather River Canyon on 1930's era rock and mortar constructed spring along Hwy 70, eight mi NW of Quincy, 2011, 2900 ft, *CPD 2658* (RMA).

Note: all of these collections were determined as *H. tenax* (Hedwig) Jennings, but I am including them as *H. varium* var. *varium* to follow Vanderpoorten (2014).

Hygrohypnum bestii (Renauld & Bryhn) Holzinger

Uncommon; on submerged rocks in perennial streams. No collections with sporophytes.

Plumas: on rock in stream, eight mi NW of Quincy, 2002, 4400 ft, *CPD* 890 (UC); on wet rock in Stag Creek, five mi NW of Little Grass Valley Reservoir, 2002, 1707 m, *CPD & Gross* 677 (Harpel personal herbarium); on rock under running water from spring fed tributary to Long Valley Creek, 19 mi E of Quincy, 2005, 6196 ft, *CPD* 2163 (RMA); on rock in cascading streamlet in Feather River Canyon near Rock Creek, 2006, 1735 ft, *Shevock* 28917 (CAS).

Hygrohypnum luridum (Hedwig) Jennings

Uncommon; on submerged rocks in perennial streams. No collections with sporophytes.

Plumas: on rock submerged in stream, 1 mi S of Bucks Lake, 2004, 5398 ft, *CPD & Toren* 1585 (RMA); attached to rock, submerged in Letterbox Creek, three mi W of Bucks Lake, 2003, 4611 ft, *CPD* 1226 (UC); on saturated rock at edge of South Fork Long Valley Creek, four mi E of Cromberg, 2004, 6037 ft, *CPD* 1578 (RMA, Janssens personal herbarium); attached to submerged rocks in Jackson Creek, 4.5 mi N of Blairsden, 2004, 5927 ft, *CPD & Toren* 1616 (RMA).

Hygrohypnum molle (Hedwig) Loeske

Uncommon; on rocks, submerged in streams or in springs. No collections with sporophytes.

Plumas: stream near Johnsville, *Ikenberry* 371 (MO – determined by Koch); attached to rock in spring underneath dense forest canopy, 16 mi E of Quincy, 2005, 6069 ft, *CPD* 2141 (RMA). **Sierra:** on rock in splash zone of Gibson Creek underneath dense forest canopy, five mi NE of LaPorte, 2005, 5608 ft, *CPD & Toren* 2252 (RMA).

Hygrohypnum ochraceum (Turner ex Wilson) Loeske

Uncommon; on wet rocks and wood. No collections with sporophytes.

Plumas: in ephemeral drainage across granitic soils, near Gold Lake in Bucks Lake Wilderness, 11 mi W of Quincy, 2001, 6010 ft, *CPD, Hanson & Norris* 437 (RMA, Harpel personal herbarium); on saturated rotten wood in headwaters of Tollgate Creek underneath moderate forest canopy, nine mi NE of Quincy, 2004, 5935 ft, *CPD* 1427 (RMA); on wet rock in splash zone of Long Valley Creek, 20 mi E of Quincy, 2005, 6567 ft, *CPD & Toren* 2334 (RMA). **Sierra:** on rock under 5-ft-tall dripping waterfall in tributary to Rock Creek, 30 mi E of Oroville, 2005, 4240 ft, *CPD* 1923 (RMA); on rock at stream margin in Sears Ravine, three mi NE of LaPorte, 2005, 4860 ft, *CPD* 2268 (UC).

Hygrohypnum smithii (Swartz) Brotherus

Plumas: stream near Quincy, *Ikenberry* 1322 (MO).

Note: specimen found during on line herbarium search but not examined by this author. This record is considered unconfirmed.

Hymenostylium recurvirostrum (Hedwig) Dixon

Rare, on rock. No sporophytes on either collection by author; Showers collection not examined.

Plumas: on rock with seeping water and calcium deposits underneath moderate forest canopy along East Branch North Fork Feather River, 15 mi NW of Quincy, 2006, 3000 ft, *CPD & Miller* 2341 (CAS, MO, determined by Zander); on granitic rock outcrop along road cut, 0.5 mi E of the Butte County line on Hwy 70, 24 mi W of Quincy, 2009, 1700 ft, *CPD* 2559 (RMA); on wet soil over calcareous rock, North Fork Feather River

Canyon at Caribou, 1976, 3000 ft, *Showers* 3339, (MO, determined by Zander).

**Hypnum circinale* Hooker

Uncommon; on downed logs and base of conifers. Sporophytes unrecorded.

Butte: on rotten Douglas-fir log over tributary to Peavine Creek, two mi NE of Brush Creek, 2003, 3000 ft, *CPD* 856 (UC); on cedar bark and base of Douglas-fir along tributary to Flea Creek, two mi NE of Concow Reservoir and 16 mi E of Chico, 2004, 2919 ft *CPD & Toren* 1816 (UC). **Plumas:** on base of old-growth Douglas-fir in American House Ravine, 29 mi E of Oroville, 2005, 4175 ft, *CPD & Toren* 2015 (RMA); on base of Douglas-fir along French Creek mesic riparian zone, eight mi SW of LaPorte, 2009, 3980 ft, *CPD & Toren* 2593 (CAS); on base of old-growth Douglas-fir in Clark's Ravine, 29 mi E of Oroville, 2005, 4100 ft, *CPD & Toren* 2038 (UC).

Hypnum subimponens Lesquereux

Common; on wood, rock and soil underneath moderate to dense forest canopy. Sporophytes common.

Butte: on soil underneath dense forest canopy, five mi E of Brush Creek community, 2002, 2769 ft, *CPD* 538 (UC); on dry rock in riparian zone underneath dense forest canopy, two mi WNW of Forbestown, 2003, 2320 ft, *CPD* 931 (CAS). **Plumas:** on rock underneath dense forest canopy, two mi W of Little Grass Valley Reservoir, 2002, 5380 ft, *CPD & Gross* 919 (RMA, Harpel personal herbarium); on moist vertical rock wall adjacent to cascading stream, seven mi E of Quincy, 2004, 3794 ft, *CPD* 1293 (RMA). **Sierra:** on conifer log suspended over Little Rock Creek underneath dense forest canopy, six mi S of LaPorte, 2005, 3920 ft, *CPD* 1870 (RMA). **Yuba:** on base of *Pseudotsuga menziesii*, five mi SW of LaPorte, 2005, 4060 ft, *CPD & Toren* 1980 (RMA).

Imbriobryum alpinum (Hudson ex Withering) N. Pedersen

Uncommon, on soil and rock in wet meadows and stream margins. Sporophytes present on one collection (*Ahart and Dittes* 12435).

Plumas: in unnamed meadow 1 mi E of Little Grass Valley Reservoir, 2002, 1704 m, *CPD & Gross* 679 (RMA, determined by Toren and Spence 2014); on wet soil in serpentine seep in full sun, two mi S of Bucks Lake, 2009, 5500 ft, *Toren s.n.* (CAS 1168987); on rocks along dry stream about 0.5 mi NE of Eisenheimer Peak, 2005, 6698 ft, *Ahart and Dittes* 12435 (CAS, CHSC); on wet soil in a small meadow about 1.5 mi NW of Little Grass Valley Reservoir, 2002, 5417 ft, *Ahart and Dittes* 9724 (CAS, CHSC).

Note: D. Toren determined each of these four collections in 2014.

Imbriobryum miniatum (Lesquereux) J.R. Spence

Common; on seasonally wet rock and less commonly on soil. Sporophytes uncommon.

Butte: on massive granitic rock in Feather River Canyon immediately E of Arch Rock, 2006, 1575 ft, *Shevock* 28915 (CAS). **Plumas:** on seeping bedrock along ephemeral tributary to Greenhorn Creek, seven mi E of Quincy, 2004, 4040 ft, *CPD* 1390 (Spence); on rocky flat at edge of pool of water in tributary to Middle Fork Feather River, two mi SW of Portola, 2002, 1540 m, *CPD & Gross* 599 (Harpel); on dry log two feet from live spring under dense forest canopy on

Hartman Bar Ridge, 31 mi NE of Oroville, 2002, 5440 ft, *CPD & Gross 918* (Spence personal herbarium, UC). **Sierra:** on slate bedrock in narrow stream gorge in Cedar Grove Ravine, three mi E of LaPorte, 2005, 4745 ft, *CPD & Toren 2289* (RMA).

Imbricbryum muehlenbeckii (Bruch & Schimper) N. Pedersen

Common; on ephemeral moist soil and rock under open to moderate forest canopy. Sporophytes uncommon.

Plumas: on sandy soil in ephemeral riparian zone under sparse forest canopy, two mi E of Portola, 2002, 1496 m, *CPD & Gross 571* (Spence personal herbarium, UC); on moist soil in meadow opening near South Branch of Ward Creek, 16 mi E of Quincy, 2005, 6671 ft, *CPD, Toren & Friend 2060* (RMA, Spence personal herbarium); on vertical, seeping rock face under sparse forest canopy in unnamed tributary to Willow Creek, three mi NE of Graeagle, 2004, 5851 ft, *CPD 1512* (RMA); on soil in spring in forest opening adjacent to tributary to Rabbit Creek, 1/4 mi W of LaPorte, 2005, 4978 ft, *CPD & Toren 2028* (RMA).

Imbricbryum torenii J.R. Spence & Shevock

Uncommon; on soil and rock in full sunlight. No collections with sporophytes.

Plumas: on edge of ephemeral stream, three mi SE of Portola, 2002, 5200 ft, *CPD & Gross 586* (Spence personal herbarium, UC); above small pool of water in full sun, two mi SW of Portola, 2002, 1540 m, *CPD & Gross 606* (Spence personal herbarium, UC); on rock in meadow in full sun, 1 mi E of Little Grass Valley Reservoir, 2002, *CPD & Gross 679* (Harpel per. herb., Spence personal herbarium, UC); Highway 70 near Belden Norris 69975 (UC).

Note: This recently described species (Spence and Shevock, 2015) is characterized by having shiny-metallic red or green leaves but is distinguished from *I. muehlenbeckii* and *I. alpinum* in having broadly ovate leaves with short distal laminal cells and a short excurrent costa and a cylindric capsule with large spores.

Isopterygiopsis pulchella (Hedwig) Z. Iwatsuki

Uncommon; on moist rock. Sporophytes common.

Plumas: on wet rock 1/2 mi W of Little Grass Valley Reservoir, 2009, 5200 ft, *CPD & Toren 2564* (CAS). **Sierra:** on deeply shaded, moist vertical rock face and in small cave/adit entrance of "Wink Eye Mine" with dripping water, along Potosi Creek, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2225* (RMA).

Isothecium cardotii Kindberg

Common on W side of study area; on tree boles and on rock and wood on forest floor. Sporophytes common.

Butte: on vertical rock wall in roadside opening, two mi NW of Forbestown, 2003, 1588 ft, *CPD 1131* (RMA); on rock ledge of exposed vertical rock wall in riparian zone, two mi NW of Forbestown, 2003, 1588 ft, *CPD 1128* (UC). **Yuba:** on moist rotten wood underneath dense forest canopy, three mi SE of Challenge, 2003, 2350 ft *CPD 987* (RMA).

Note: Although I am unconvinced that there is a reliable break between *I. cardotii* and *I. stoloniferum*, I have determined both species as recognized in Norris & Shevock (2004b) and Schofield (2014).

Isothecium cristatum (Hampe) H. Robinson

Abundant on W side of study area; on rotting wood, bases of trees and over rock. Sporophytes common.

Butte: on stump underneath dense forest canopy, 18 mi E of Chico, 2004, 3206 ft, *CPD & Toren 1762* (RMA). **Plumas:** on base of mature *Pseudotsuga menziesii* underneath dense forest canopy, four mi NE of Strawberry Valley, 2005, 3580 ft, *CPD 2010* (RMA). **Yuba:** on rotting wood on forest floor underneath dense forest canopy, five mi SE of Challenge, 2003, 2220 ft, *CPD 962* (RMA); over rock underneath dense forest canopy, 1/2 mi SE of Forbestown, 2003, 2600 ft, *CPD 1102* (UC).

Isothecium stoloniferum Bridel

Common on W side of study area; on tree boles and on rock and wood on forest floor underneath moderate to dense forest canopy. Sporophytes common.

Butte: on rock boulder underneath dense forest canopy, five mi N of Forbestown, 2003, 2160 ft, *CPD 1031* (UC); on fallen *Taxus brevifolia* underneath dense forest canopy, 18 mi E of Chico, 2004, 3206 ft, *CPD & Toren 1759* (RMA). **Sierra:** on rocks adjacent to Morris Ravine underneath dense forest canopy, five mi SE of LaPorte, 2005, 4200 ft, *CPD & Toren 2316* (RMA). **Yuba:** on *Lithocarpus densiflorus* underneath dense forest canopy, 1 mi S of Challenge, 2003, 2520 ft *CPD 1201* (UC).

Note: see comment under *I. cardotii* above.

Kindbergia oregana (Sullivant) Ochyra

Uncommon; on soil, leaf litter and over logs underneath dense forest canopy. No collections with sporophytes.

Butte: on rotted *Pseudotsuga menziesii* log underneath dense forest canopy, 18 mi E of Chico, 2004, 3206 ft, *CPD & Toren 1753* (RMA). **Yuba:** on roadside soils underneath moderate forest canopy, five mi SE of Challenge, 2003, 2220 ft, *CPD 959* (RMA); on forest soil underneath dense forest canopy, two mi E of Strawberry Valley, 2005, 2900 ft, *CPD 1842* (RMA); on forest duff adjacent to perennial tributary to Dry Creek underneath dense forest canopy, 1 mi S of Challenge, 2003, 2520 ft, *CPD 1197* (RMA).

Kindbergia praelonga (Hedwig) Ochyra

Abundant; on soil and rock on margins of seeps, springs and creeks, uncommonly submerged in clear streams. It is also an abundant terrestrial species on W side of study area. The species is present in most moderate and lower elevations riparian zones in the study area. Sporophytes rare.

Butte: on wet soil on vertical dripping seep, two mi NW of Forbestown, 2003, 2070 ft, *CPD 1021* (RMA). **Plumas:** on soil at edge of stream, 1 mi S of Bucks Lake, 2004, 5398 ft, *CPD & Toren 1586* (RMA); submerged underneath one-foot-deep stream at Domingo Spring, eight mi NW of Chester, 2003, 1547 m, *CPD 965* (CAS, MO, RMA). **Sierra:** on organic soils at edge of spring-fed tributary to Rock Creek, 30 mi E of Oroville, 2005, 4240 ft, *CPD 1917* (RMA). **Yuba:** submerged in headwaters of Indian Creek, underneath dense forest canopy, 1/2 mi S of Woodleaf, 2003, 3040 ft, *CPD 1220* (RMA).

Leptobryum pyriforme (Hedwig) Wilson

Uncommon; on moist soil or rotting wood. Sporophytes common.

Plumas: on tree stump in moist seeping spring at Blakeless Spring, three mi NW of Lake Davis, 2003, 6370 ft, *CPD 1103* (RMA); on moist soil at margin of Dolly Creek, 14 mi E of Quincy, 2005, 5724 ft, *CPD 2120* (RMA); on calcium encrusted pine stump in fen-like wetland 15 mi E of Quincy, 2005, 6414 ft, *CPD 2151* (RMA); on soil in seep adjacent to Little Long Valley Creek, two mi N of Cromberg, 2007, 4880 ft, *CPD 2405* (RMA).

Leptodictyum riparium (Hedwig) Warnstorf

Rare; found on wood in stream channel. Sporophytes unknown in study area.

Plumas: on log in center of intermittent stream five mi N of Antelope Lake, 2002, 5480 ft, *CPD 670* (RMA, Harpel personal herbarium); on tree root in dry stream channel, 1 mi N of Bagley Pass and 11 mi NNW of Portola, 2007, 5880 ft, *CPD & Toren 2401* (UC).

Leucolepis acanthoneura (Schwägrichen) Lindberg

Uncommon; on moist soil, soil over rock and in organic forest litter, often on the margins of creeks. No collections with sporophytes.

Butte: on moist soil at edge of spring underneath dense forest canopy, 18 mi E of Chico, 2004, 3206 ft, *CPD & Toren 1747* (RMA). **Plumas:** on moist soil in riparian zone, five mi NW of Quincy, 2002, 3640 ft, *CPD 882* (RMA). **Sierra:** on organic soils at margin of creek in Morris Ravine, five mi SE of LaPorte, 2005, 4200 ft, *CPD & Toren 2320* (RMA). **Yuba:** on soil over rock in channel of Dry Creek, 1 mi S of Challenge, 2003, 2520 ft, *CPD 1196* (RMA).

Meesia triquetra (Linnaeus ex Jolyclerc) Åongström

Uncommon; found on saturated soils in fens. Sporophytes rare.

Plumas: on soil in fen at Tamarack Flat, seven mi SW of Quincy, 2001, 5400 ft, *CPD 396* (UC); on soil in fen, 11 mi WNW of Quincy, 2002, 1585 m, *CPD 671* (UC, Harpel personal herbarium); on soil in fen at Bucks Summit, 10 mi WSW of Quincy, 2003, 1690 m, *CPD 1122* (MO, UC).

Meesia uliginosa Hedwig

Rare; on saturated wood in fens. Extensive surveys by U.S. Forest Service botanists for this species due to being listed as a Forest Service sensitive species and only two sites found. Sporophytes present on both collections.

Plumas: on rotting stumps in fen near Freeman Creek, eight mi NW of Portola, 2004, 5900 ft, *Toren 9348* (CAS, UC); on old log in stream channel in wet meadow, two mi W of Lake Davis and 9.5 mi NW of Portola, 2007, 5830 ft, *CPD 2364* (UC).

Meiotrichum lyallii (Mitten) G.L. Merrill

Common; on seasonally or perennially moist soil, in full sun or under dense forest canopy. Sporophytes uncommon.

Plumas: on moist soil in meadow opening, 16 mi E of Quincy, 2005, 6671 ft, *CPD, Toren & Friend 2064* (RMA); on ephemerally moist mineral soils on old roadbed, 10 mi NE of Greenville, 2005, 5888 ft, *CPD & Toren 2181* (RMA). **Sierra:** on moist soil near Potosi Creek, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2242* (RMA). **Yuba:** on soil adjacent to tributary to Slate Creek, four mi SW of LaPorte, 2005, 4060 ft, *CPD 1972* (RMA).

Mielichhoferia elongata (Hoppe & Hornschuch) Nees & Hornschuch

Rare; on roadside cutbank of mineral rich soils. No sporophytes at known site.

Plumas: on mineral soils in seep on roadside cutbank through phyllite rock type, five mi E of Twain and 1/8 mi north of Paxton in Feather River Canyon, 2009, 2993 ft, *CPD 2561* (DUKE).

Mnium marginatum (Dickson ex Withering) P. Beauvois.

Uncommon; on saturated soil, or less commonly on rock. Sporophytes common.

Plumas: on moist soil on margin of Jackson Creek, five mi N of Blairsden, 2004, 5927 ft, *CPD 1614* (UC); on saturated log in splash zone of Joseph Creek, 12 mi E of Quincy, 2005, 6331 ft, *CPD 2067* (RMA); on saturated soil in seep coming from base of rock cliff, 13 mi E of Quincy, 2005, 6452 ft, *CPD 2100* (RMA).

**Neckera douglasii* Hooker

Rare; found on trees in wet forests on W side of study area. No collections with sporophytes.

Butte: on *Lithocarpus densiflorus* bole underneath dense forest canopy, 1 mi E of Brush Creek community, 2002, 2763 ft, *CPD 508* (UC); on bole of fallen *Lithocarpus densiflorus*, underneath dense forest canopy at Challenge Work Center, 2004, 2900 ft, *Toren 9339* (RMA).

Neckera menziesii Drummond

Uncommon; on rock or hardwoods in shaded conditions. No collections with sporophytes.

Plumas: on base of *Alnus rhombifolia* adjacent to tributary to Greenhorn Creek, seven mi E of Quincy, 2004, 3794 ft, *CPD 1287* (UC); on rock underneath moderate forest canopy near Caribou Powerhouse, 15 mi NW of Quincy, 2006, 3000 ft, *CPD & Miller 2344* (RMA); on moist rock outcrop in Clark's Ravine, 29 mi E of Oroville, 2005, 4420 ft, *CPD 2039* (RMA). **Sierra:** on rock underneath dense forest canopy, five mi SE of LaPorte, 2005, 4200 ft, *CPD & Toren 2319* (RMA).

Niphotrichum elongatum (Ehrhart ex Frisvoll) Bednarek-Ochyra & Ochyra

[*Racomitrium elongatum* Ehrhart ex Frisvoll]

Rare, one collection; on sandy soil. Sporophytes unknown.

Plumas: on sandy soil in historical (1850's) mining tailings at "Barnard's Diggings", 28 mi E of Oroville, 2005, 4760 ft, *CPD 2040* (KRAM, UC, determined by Bednarek-Ochyra).

Nogopterium gracile (Hedwig) Crosby & W.R. Buck

Rare; on the bark of hardwood trees or on dry rock. Sporophytes absent on both collections. **Butte:** on *Acer macrophyllum* tree bole, 19 mi E of Chico, 2004, 3140 ft, *CPD & Toren 1786* (RMA). **Yuba:** on rock outcrop, two mi E of Strawberry Valley, 2005, 2680 ft, *CPD 1849* (RMA).

Oncophorus virens (Hedwig) Bridel

Uncommon; on wet wood underneath canopy cover in riparian zones above 5000 ft. Sporophytes common.

Plumas: on wet log along creek, three mi SE of Bucks Lake, 2004, 5500 ft, *Toren s.n.16 June 2004* (RMA); on moist log along seeping headwaters of Miller Creek underneath dense canopy of *Alnus tenuifolia*, six mi WSW of Cromberg, 2007, 6120 ft, *CPD 2388* (RMA); on wet rotted wood along headwaters of Cascade Creek,

13 mi E of Quincy, 2005, 6472 ft, *CPD & Toren 2094* (RMA); on saturated wood in Long Valley Creek, 20 mi E of Quincy, 2005, 6567 ft, *CPD & Toren 2172* (RMA).

Orthodicranum tauricum (Sapjegin) Smirnova

Abundant; on downed logs, stumps and bark of live or dead trees. Sporophytes common.

Butte: on base of *Pseudotsuga menziesii* underneath sparse forest canopy, 18 mi E of Chico, 2005, 3036 ft, *CPD & Toren 1731* (RMA). **Plumas:** on rotting wood adjacent to Denten Creek, 1 mi E of Graeagle, 2004, 4700 ft, *CPD & Miller 1361* (RMA); on *Acer macrophyllum*, 1/4 mi NW of Brush Creek community, 2002, 3057 ft, *CPD 520* (UC). **Sierra:** on stump of *Pseudotsuga menziesii* along Little Rock Creek underneath dense forest canopy, six mi S of LaPorte, 2005, 3920 ft, *CPD 1862* (RMA). **Yuba:** on moist rotten log underneath dense forest canopy, three mi SE of Challenge, 2003, 2350 ft, *CPD 984* (RMA).

Orthotrichum affine Schrader ex Bridel

Rare; on tree boles. Sporophytes common.

Plumas: on *Alnus rhombifolia* bole underneath dense forest canopy along Greenhorn Creek, five mi E of Quincy, 2004, *CPD 1648* (RMA); in riparian zone of Sulphur Creek, four mi W of Portola, 2002, 1402 m, *CPD 548* (UC); on *Abies concolor* snag underneath dense forest canopy, four mi W of Thompson Peak, 2002, 2006 m, *CPD 1083* (RMA).

Orthotrichum confusum R. Medina, F. Lara & Garilleti
Uncommon; on tree boles, generally underneath dense forest canopy. Sporophytes common.

Butte: on base of *Taxus brevifolia* adjacent to Lockerman Creek, 19 mi E of Chico, 2004, 3180 ft, *CPD & Toren 1790* (UC, MAUAM); on shaded hardwood branches above small creek along Forest Rd 23N30, three mi E of Cresta, 2009, 4500 ft, *Toren 9721* (CAS, MAUAM). **Plumas:** on bole of *Alnus rhombifolia* in French Creek, eight mi SW of LaPorte, 2009, 3980 ft, *CPD 2596* (MAUAM). **Sierra:** on bark of *Taxus brevifolia* adjacent to Little Rock Creek, six mi S of LaPorte, 2005, 3920 ft, *CPD & Toren 1884 pro parte* (RMA). **Yuba:** on bole of *Alnus rhombifolia* underneath dense forest canopy along Gold Run Creek, five mi SW of LaPorte, 2005, 4060 ft, *CPD & Toren 1983* (MAUAM, this specimen cited and photos used for species description by Medina et al. 2012).

Note: this species is similar to *O. consimile* Mitten and was described by Medina et al. (2012). Spanish bryologist Francisco Lara determined specimens. This species is different from *O. consimile* in the following ways: filiforme apex of leaves, the leaves slightly flexed and the short cylindrical capsule; there are also differences in peristome ornamentation.

Orthotrichum consimile Mitten

Uncommon; epiphytic under partial shade. Sporophytes common. **Plumas:** on bole of *Alnus rhombifolia* in Feney Ravine, 28 mi E of Oroville, 2005, 3480 ft, *CPD 2006* (MAUAM). **Sierra:** on bole of *Taxus brevifolia* in Little Rock Creek, six mi S of LaPorte, 2005, 3920 ft, *CPD & Toren 1884* (MAUAM). **Yuba:** on bole of *Acer macrophyllum* in tributary to Dry Creek, 1 mi S of Challenge, 2003, 2520 ft, *CPD 1204* (MAUAM).

Orthotrichum laevigatum J.E. Zetterstedt

Common; on dry or damp rocks in full sun to dense shade; occasionally on wood. Sporophytes common.

Plumas: on dry rock outcrop under dense forest canopy, seven mi SW of Quincy, 2001, 4060 ft, *CPD 395* (UC); on moss-covered base of 50-ft tall monolithic vertical conglomerate volcanic rock with calcium deposits, 13 mi E of Quincy, 2005, 6452 ft, *CPD 2097* (RMA). **Sierra:** on damp rock near Potosi Creek underneath dense forest canopy, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2237* (RMA); on base of tree and exposed roots in steep, narrow stream gorge of Cedar Grove Ravine underneath sparse forest canopy, three mi E of LaPorte, 2005, 4745 ft, *CPD & Toren 2293* (RMA).

Orthotrichum obtusifolium Schrader ex Bridel

Rare, on bark. Sporophytes absent on single collection from study area, but gemmae common.

Plumas: on bark of *Salix* underneath canopy of *Alnus rhombifolia* along Greenhorn Creek, five mi E of Quincy, 2004, 3700 ft, *CPD & Toren 1647* (RMA).

Orthotrichum papillosum Hampe

Abundant on boles and branches of hardwood trees, conifer trees and shrubs underneath moderate to dense forest canopy at low to moderate elevations. Sporophytes common.

Butte: on *Corylus cornuta* stem adjacent to Lockerman Creek, 19 mi E of Chico, 2004, 3180 ft, *CPD & Toren 1784* (RMA). **Plumas:** epiphytic on *Alnus rhombifolia*, eight mi NW of Quincy, 2003, 4400 ft, *CPD & Gross 891* (UC). **Sierra:** on bole of *Pseudotsuga menziesii* in Sackett's Gulch, four mi NE of LaPorte, 2005, 5075 ft, *CPD 2310* (RMA). **Yuba:** epiphytic on *Quercus kelloggii*, six mi SE of Challenge, 2003, 2740 ft, *CPD 945* (RMA, Harpel personal herbarium); epiphytic on *Cornus nuttallii* bole along tributary to Dry Creek, 1 mi S of Challenge, 2003, 2520 ft, *CPD 1205* (UC).

Note: Although *Orthotrichum papillosum* is not commonly recognized by authors outside of California (Vitt 2014), there is good reason to do so. Compared to the interior (European) form of *O. lyellii* Hooker & Taylor, there is a distinct difference in leaf shape, and gemmae are never present (Kellman 2003; Norris and Shevock 2004b). Although some overlapping of range occurs, other authors in California (Kellman 2003; Norris and Shevock 2004b) have noted that *O. papillosum* is much more common in the coastal areas, and *O. lyellii* is more common inland. I have found the reverse: I have never found *O. lyellii sensu stricto* (i.e., no collections with gemmae) in the study area to date.

Orthotrichum pellucidum Lindberg

Rare, on rock. Sporophytes present on single collection. **Butte:** on shaded limestone boulder along Forest Rd 23N30 W of Four Trees, four mi SE of Cresta, 2009, 4500 ft, *Toren 9720* (CAS, determined by F. Lara).

Note: the species may be confused with *O. cupulatum* Hoffman ex Bridel.

Orthotrichum pylaisii Bridel

Rare, on rock. Single collection at NY not reviewed by author.

Plumas: on rock in Graeagle Valley, 1900, 6500 ft, *Leiberg 5469* (NY).

Note: There are several annotation slips on this specimen. The earliest has *O. rhabdophorum* Vent. (determined by Leo Francis Koch Herbarium of the University of Michigan). The second annotation has *O. microblephare* (*O. idahoense*) annotated 1970 by D. H. Vitt (which was

later = *arcticum* written in pencil). Vitt (2014) lists all of these names as synonyms of *Orthotrichum pylaisii*. Vitt is the North American expert on this genus and therefore this determination is trusted.

Orthotrichum rupestre Schleicher ex Schwägrichen
Common; on seasonally submerged or dry rocks, usually underneath forest canopy. Sporophytes common. **Butte**: on dry, upland serpentinite rock underneath sparse forest canopy, 16 mi E of Chico, 2004, 3010 ft, *CPD & Toren 1805* (RMA). **Plumas**: on granite rock in riparian zone, six mi SW from Portola, 2002, 1484 M, *CPD & Gross 564* (UC); on seasonally submerged rock along Yellow Creek, 16 mi NW of Quincy, 2006, 2280 ft, *CPD, B. Shaw, Shevock, Kellman, Vitt & Harpel 2359* (RMA); on volcanic rock outcrop in open *Pinus/Artemisia* community, nine mi NE of Greenville, 2005, 5452 ft, *CPD & Toren 2196* (RMA). **Yuba**: on rock outcrop near tributary to Slate Creek underneath dense forest canopy, two mi E of Strawberry Valley and 30 mi E of Oroville, 2005, 2900 ft, *CPD 1843* (RMA).

Orthotrichum speciosum Nees
Rare; epiphytic under partial shade. Sporophytes present on single collection. **Plumas**: epiphytic on *Cornus* in riparian zone, two mi W from LaPorte in headwaters of Lost Creek, 2009, 5080 ft, *CPD & Toren 2619* (RMA).

Orthotrichum species A
Uncommon; on tree boles, generally underneath dense forest canopy. Sporophytes common.

Butte: on base of *Taxus brevifolia* adjacent to Lockerman Creek, 19 mi E of Chico, 2004, 3180 ft, *CPD & Toren 1790* (UC); on shaded hardwood branches above small creek along Forest Rd 23N30, three mi E of Cresta, 2009, 4500 ft, *Toren 9721* (CAS). **Plumas**: on bole of *Alnus rhombifolia* in Fenev Ravine, 28 mi E of Oroville, 2005, 3480 ft, *CPD 2006* (Madrid University Herbarium).

Note: Dr. Francisco Lara at Madrid University (Universidad Autonoma de Madrid) recognizes this taxon as an undescribed moss related to *O. lyellii*, but with recurved leaf margins and exserted capsules, among other differences; it is widespread along the Sierra Nevada Mountains of California.

Philonotis capillaris Lindberg
Rare; on moist soil. collections without sporophytes. **Butte**: on moist soil over rock along old road, 1 mi E of Cresta, 2010, 1560 ft, *Toren 9761* (RMA); on moist sandy soil on road to bear Ranch Creek, opposite Shady Rest Area, S of Arch Rock tunnel, 2011, *Kellman 6120* (CAS) also same locality *CPD 2682* (CAS).

Philonotis fontana (Hedwig) Bridel var. *americana* (Dismier) Flowers ex H.A. Crum

Common; on saturated soils in springs and fens. Sporophytes uncommon. **Plumas**: on saturated soils in spring with *Darlingtonia* in headwaters of Spanish Creek watershed, 10 mi NW of Quincy, 2002, 5200 ft, *CPD & Gross 1138* (FLAS, DUKE); on saturated soils in Buck's Summit Fen, 10 mi W of Quincy, 2005, *CPD 2043* (DUKE); on soil in seep, three mi S of Portola, 2002, *CPD 589* (UC).

Philonotis fontana var. *fontana* (Turner) Bridel
Abundant; on saturated soils in springs and fens. Sporophytes uncommon. **Plumas**: in fen at headwaters of China Gulch Creek, five mi S of Bucks Lake Lodge,

2003, 5410 ft, *CPD 1042* (DUKE); in saturated soil in wet meadow in Pine Creek Valley, nine mi E of Quincy, 2005, 7040 ft, *CPD 2269* (DUKE). **Sierra**: in seep on rock outcrop at mouth of Little Rock Creek, six mi S of LaPorte, 2005, 3800 ft, *CPD 1902* (RMA). **Yuba**: on saturated soil in seep coming into Brushy Creek, 2.5 mi E of Strawberry Valley and 27 mi E of Oroville, 2005, 3501 ft, *CPD 1944* (RMA).

Philonotis fontana (Hedwig) Bridel var. *pumila* (Turner) Bridel

Uncommon; on saturated soils in springs and fens. Sporophytes uncommon. **Plumas**: on rock at edge of seep on Rock Island Ridge, 13 mi W of Quincy, 2004, 5052 ft, *CPD 1602* (RMA); in saturated soil in patch of *Alnus*, three mi W of Bucks Lake, 2003, 5256 ft, *CPD 1047* (DUKE); in saturated soils in fen at headwaters of Taylor Creek, nine mi NE of Quincy, 2004, 6907 ft, *CPD & Toren 1667* (RMA).

Note: Two collections from high elevations, *CPD 1035 & CPD 1189* both at DUKE, have much yellower leaves and a different leaf shape than other *P. fontana* collections. They have been reviewed by *Philonotis* expert D. Griffin and he named *CPD 1035* as *Philonotis fontana* variety *pumila* (Turner) Bridel and *CPD 1189* as *Philonotis fontana* (Hedwig) Bridel based on the bicuspid marginal teeth (personal communication). Griffin went further and said that he has found, after reviewing a couple of thousand specimens, which practically every gametophytic character is subject to variation except the bifid teeth. B. Shaw (personal communication 2015) indicated that future studies may reveal novelties with these high elevation samples.

Physcomitrium californicum E. Britton

Uncommon; on moist, often clay soils in forest openings near water. Sporophytes common. **Plumas**: on soil at margin of Little Summit Lake, 17 mi E of Quincy, 2005, 5856 ft, *CPD 2109* (RMA); on eroded moist clay soil on margin of Onion Valley Creek, nine mi NE of LaPorte, 2005, 6221 ft, *CPD & Toren 2264* (RMA).

Plagiomnium cuspidatum (Hedwig) T.J. Koponen

Uncommon; on shaded, wet soil. No collections with sporophytes. **Butte**: on soil at stream margin on Watson Ridge, 21 mi NE of Oroville, 2002, 4034 ft, *CPD 758* (RMA); on seepy rock outcrop underneath dense canopy, two mi NE of town of Brush Creek, 2002, 3080 ft, *CPD & Gross 1166* (RMA). **Plumas**: on saturated soils in spring adjacent to Grizzly Lake, two mi SW of Bucks Lake, 2003, 5150 ft, *CPD 1143* (RMA). **Sierra**: on wet soil in seep in McNair Meadow, nine mi S of Portola, 2002, 1644 m, *CPD 630* (Harpel personal herbarium).

Plagiomnium ellipticum (Bridel) T.J. Koponen

Uncommon; on saturated soils, sometimes in full sun. No collections with sporophytes. **Plumas**: on saturated soils along stream, two mi SE of Portola, 2002, 5640 ft, *CPD & Gross 617* (UC); on saturated soils in headwaters of Boulder Creek, 1.5 mi NW of Thompson Peak, 2002, 1938 m, *CPD & Gross 1071* (UC); on peat soils in full sun of Oldhouse Fen, 10 mi NW of Portola and 1.5 mi W of mouth of Grizzly Creek at Lake Davis, 2007, 5860 ft, *CPD & Toren 2402* (RMA).

Plagiomnium insigne (Mitten) T.J. Koponen

Rare; on wet soil. Neither collection with sporophytes. **Butte**: on soil at stream margin under dense canopy on

Watson Ridge, 21 mi NE of Oroville, 2002, 4034 ft, *CPD & Gross 737* (RMA); on rock dense to stream, 1.5 mi NE of town of Brush Creek, 2002, 3000 ft, *CPD & Gross 1185* (UC). **Plumas:** on moist stream bank under dense shade along French Creek, eight mi SW of LaPorte, 2009, 3980 ft, *CPD & Toren 2588* (RMA).

Plagiomnium medium (Bruch & Schimper) T.J. Koponen
Common; on moist soil at margins of creeks, spring and meadows. Sporophytes uncommon. **Butte:** on moist soil bank of creek underneath dense canopy near town of Brush Creek, 18 mi NE of Oroville, 2002, 2920 ft, *CPD 861* (RMA). **Plumas:** on saturated soils at edge of meadow, seven mi W of Thompson Peak, 2002, 2082 m, *CPD 1084* (UC); Quincy, 1934, 3500 ft, *Ikenberry 1415* (MO). **Sierra:** on moist soil in roadside ditch, near historical town site of Queen City, three mi SE of LaPorte, 2005, 4920 ft, *CPD 2329* (RMA).

Plagiomnium venustum (Mitten) T.J. Koponen
Uncommon; on shaded rocks and soil on forest floor. Sporophytes uncommon. **Plumas:** on moist soil adjacent to cascading perennial creek, five mi E of East Quincy, 2004, 3794 ft, *CPD 1297* (UC); on dry rock talus 300 yards up river from Caribou Powerhouse, 15 mi NW of Quincy, 2006, 3000 ft, *CPD 2357* (RMA). **Sierra:** on soil underneath partial forest canopy, six mi S of LaPorte, 2005, 3920 ft, *CPD 1887* (RMA). **Yuba:** on rock adjacent to Brushy Creek, two mi E of Strawberry Valley and 27 mi E of Oroville, 2005, 3501 ft, *CPD 1945* (RMA).

Plagiothecium denticulatum (Hedwig) Schimper
Uncommon; on saturated soil, wood or rock. Sporophytes common. **Plumas:** on saturated soil in splash zone of Joseph Creek, 12 mi E of Quincy, 2005, 6824 ft, *CPD 2074* (RMA); on damp soil at edge of small stream, two mi W of Bucks Lake, 2004, 5500 ft, *Toren 9340* (RMA). **Sierra:** on seeping wet rock face along tributary to Slate Creek, two mi S of LaPorte, 2005, 4680 ft, *CPD & Toren 2332* (RMA); on saturated soil at margin of spring in tributary to Potosi Creek, six mi NE of LaPorte, 2005, 5793 ft, *CPD & Toren 2307* (RMA).

Plagiothecium laetum Schimper
Uncommon; on rotten logs in forest underneath dense canopy. Sporophytes common. **Butte:** on moist rotten log in riparian zone of tributary to Dogwood Creek, 16 mi E of Chico, 2005, 3820 ft, *CPD 1837* (Harpel). **Yuba:** on rotten old-growth conifer log in spray zone of cascading waterfall of Brushy Creek, 2.5 mi E of Strawberry Valley, 2005, 3400 ft, *CPD 1950* (RMA); on well rotted old-growth *Pseudotsuga menziesii* log in riparian zone, three mi E of Strawberry Valley, 2005, 3740 ft, *CPD 1959* (RMA).

Platydictya jungermannioides (Bridel) H.A. Crum
Uncommon; on moist soil in springs. Sporophytes uncommon. **Plumas:** on saturated soil of spring in upper reaches of Boulder Creek, three mi SW of Thompson Peak and six mi SW of Janesville, 2002, 1654 m, *CPD 1091* (UC); on organic soils in spring, 16 mi E of Quincy, 2005, 6069 ft, *CPD 2142* (RMA); on moist soil in seep three mi E of Moonlight Peak and 10 mi NE of Greenville, 2005, 5803 ft, *CPD & Toren 2184* (RMA).

Pleuridium subulatum (Hedwig) Rabenhorst
Rare, based on lack of collections, but probably undercollected; on soil in meadow opening in springtime. Sporophytes present on single collection. **Yuba:** on soil under grasses in small forest opening, three mi SE of Challenge, 2003, 2440 ft, *CPD 972* (UC).

**Pohlia annotina* (Hedwig) Lindberg
Rare; on soil. Sporophytes absent on both collections. **Yuba:** on soil over rock near Joseph Creek, five mi SE of Challenge, 2010, 2050 ft, *Toren 9741* (DUKE); at Challenge Forest Service work center, 2010, 2560 ft, *Toren 9751* (DUKE).

Pohlia bolanderi (Lesquereux) Brotherus
Uncommon; on damp rock crevices. Sporophytes absent on all three collections. **Plumas:** on soil over rock near Joseph Creek, 12 mi E of Quincy, 2005, 6331 ft, *CPD & Toren 2079* (DUKE); on damp rock crevice at edge of High Bench Fen on Mt Fillmore, 15 mi S of Quincy, 2006, 7000 ft, *Toren 9504a* (DUKE); on rock crevices, seven mi NE of LaPorte, 2009, 6320 ft, *Toren & CPD 9711* (CAS).

Pohlia camptotrachela (Renauld & Cardot) Brotherus
Common; on moist mineral soils or soil over rock. Sporophytes uncommon. **Butte:** on shaded moist soil of old roadbank along Forest Rd 23N30, three mi E of Cresta, 2009, 4825 ft, *Toren 9717* (CAS). **Plumas:** on bare damp soil on eroded creek bank in headwaters of China Gulch Creek, five mi S of Bucks Lake, 2003, 5416 ft, *CPD 1044* (DUKE); on moist soil in middle of 100-acre opening of Walker Copper Mine tailings, 15 mi E of Quincy, 2006, 5760 ft, *CPD, Toren & Friend 2062* (RMA); on moist silty soils on roadside cutbank, 20 mi E of Quincy, 2005, 6515 ft, *CPD & Toren 2171* (RMA). **Sierra:** on clay soil at margin of headwaters of tributary to Gold Run Creek, five mi SW of LaPorte, 2005, 4570 ft, *CPD & Toren 1999* (RMA).

Pohlia cruda (Hedwig) Lindberg
Common; on moist soil, wood or rock, often on stream margins. Sporophytes common. **Plumas:** on moist soil at edge of Cascade Creek, 13 mi E of Quincy, 2005, 6253 ft, *CPD & Toren 2080* (DUKE); on soil in crack of exposed rock along Stag Creek, 33 mi NE of Oroville, 2002, 1704 m, *CPD & Gross 911* (UC). **Sierra:** on moist vertical rock face at "Wink Eye Mine", six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2227* (DUKE). **Yuba:** on soil of eroded stream bank under dense forest canopy along Simon Ravine, 5.5 mi SW of LaPorte, 2005, 4120 ft, *CPD 1969* (DUKE).

***Pohlia flexuosa* Hooker
Rare; on intermittently moist soil or rock. Gemmae abundant on collections. **Yuba:** on partly shaded, intermittently damp soil and soil over rock in fissures of vertical metamorphic rock, two mi E of Strawberry Valley, 2006, 4120 ft, *Toren 9496 & Toren 9544a* (CAS, DUKE, NY). Note: Shaw and Toren (2009) recognized this as the first and only collection in North America.

Pohlia nutans (Hedwig) Lindberg
Common; on rock, wood or soil in a variety of habitats, including fens, road cuts, rotten wood under forest canopy and exposed rock outcrops. Sporophytes common.

Plumas: on moist soil and rotting wood underneath forest canopy along Grizzly Creek, two mi SW of Bucks Lake, 2004, 5157 ft, *CPD & Toren 1567* (RMA); on base of *Pinus contorta* at edge of fen growing with *Aulacomnium palustre*, Little Summit Lake, 17 mi E of Quincy, 2005, 5813 ft, *CPD 2111* (DUKE); on soil in rock crevice on rock face in road cut at Little Grass Valley Reservoir dam, 2009, 5060 ft, *CPD & Toren 2522* (DUKE). **Sierra:** on rock adjacent to Rock Creek at historic mining town of Union Hill, five mi S of LaPorte, 2005, 4042 ft, *CPD 1938* (RMA); on soil accumulated in crevice of rock outcrop along tributary to Cedar Grove Ravine, one half mi S of historic mining town of St. Louis, three mi E of LaPorte, 2005, 4961 ft, *CPD & Toren 2299* (RMA).

Pohlia wahlenbergii (F. Weber & D. Mohr) A.L. Andrews

Common; on wet rock, soil or wood, often around creeks in shade or diffuse light. One collection with sporophytes.

Butte: on *Alnus rhombifolia* roots in dripping stream, two mi NW of Forbestown, 2003, 1588 ft, *CPD 1092* (DUKE). **Plumas:** on moist soil at edge of Dolly Creek underneath dense conifer forest canopy, 16 mi E of Quincy, 2005, 6272 ft, *CPD, Toren & Friend 2051* (RMA). **Sierra:** on open, moist soil at edge of McNair Meadow where small stream enters, 1 mi W of Calpine, 2002, 1613 m, *CPD 625* (DUKE). **Yuba:** on moist soil along creek bank underneath dense forest canopy, five mi SW of LaPorte, 2005, 4360 ft, *CPD & Toren 1977* (RMA).

Polytrichum commune Hedwig

Common; on moist to wet soil, in areas with no canopy to closed canopy forests. One collection with sporophytes.

Butte: on soil, 2.5 mi S of community of Brush Creek, 2002, 3234 ft, *CPD 539* (UC). **Plumas:** on soil at edge of small stream in open meadow, two mi NW of Little Grass Valley Reservoir dam, 2002, 1685 m, *CPD & Gross 685* (RMA, Harpel); Bucks Lake, 1934, *Ikenberry 1418* (MO). **Sierra:** in seeping portion of creek, three mi E of LaPorte, 2005, 4961 ft, *CPD & Toren 2298* (RMA). **Yuba:** in roadside ditch, five mi SE of Challenge, 2010, 2000 ft, *Toren 9740A* (RMA).

Polytrichum juniperinum Hedwig

Common; on poor and disturbed soils, in meadow, road cut or forest habitats. Sporophytes uncommon.

Butte: on soil in recess of rock outcrop, two mi NW of Forbestown, 2003, 2420 ft, *CPD 1016* (RMA). **Plumas:** on forest soils underneath dense forest canopy in headwaters of Taylor Creek, nine mi NE of Quincy, 2004, 6743 ft, *CPD 1683* (RMA). **Sierra:** on dry upland soil, six mi S of LaPorte, 2005, 3800 ft, *CPD 1904* (RMA). **Yuba:** on dry forest soil, five mi SE of Challenge, 2003, 2340 ft, *CPD 966* (RMA).

Polytrichum longisetum Swartz ex Bridel

Rare; on disturbed soils. Sporophytes absent in single collection.

Yuba: on bare soil in roadside ditch, five mi SE of Challenge, 2010, 2000 ft, *Toren 9738* (CAS).

Polytrichum piliferum Hedwig

Uncommon; on poor soils in chaparral, often in forests with *Quercus chrysolepis* or *Quercus kelloggii*. No collections with sporophytes.

Butte: on soil over granite, 0.5 mi E of Cresta, 2006, 1560 ft, *CPD 2345* (RMA). **Plumas:** on dry rock outcrop, five mi E of East Quincy, 2004, 4040 ft, *CPD 1395* (RMA). **Sierra:** on shallow soil over rock, five mi SE of LaPorte, 2005, 4200 ft, *CPD & Toren 2315* (RMA).

Porotrichum bigelovii (Sullivan) Kindberg

Common; on rock and soil in seeps and streams. No collections with sporophytes.

Butte: on thin duff over mineral soil adjacent to Lockerman Creek, 19 mi E of Chico, 2004, 3140 ft, *CPD & Toren 1795* (RMA). **Yuba:** on moist soil along creek bank underneath dense forest canopy, five mi SW of LaPorte, 2003, 2520 ft, *CPD & Toren 1193* (UC).

Pseudobraunia californica (Lesquereux) Brotherus

Uncommon; on dry rocks, underneath sparse to moderate forest canopy. Sporophytes common.

Butte: on dry ultramafic rock, 12 mi E of Chico, 2004, 3143 ft, *CPD & Toren 1828* (RMA); near Concow Dam, 1934, *Ikenberry 1213* (MO). **Plumas:** on dry, 40-foot tall rock outcrop in manzanita shrub field, eight mi NE of Quincy, 2004, 4363 ft, *CPD 1309* (RMA); on tree trunk, 1948, *Nantt s.n.* (MO). **Yuba:** on roadside soils, five mi SE of Challenge, 2003, 2220 ft, *CPD 958* (UC).

Pseudocalliergon angustifolium Hedenäs

Rare; on saturated wet meadow soils. Single collection without sporophytes.

Plumas: on saturated soil in open *Carex*-dominated wet meadow, three mi W of Thompson Peak, 2002, 6600 ft, *CPD 1078* (RMA).

Note: Determined in 2004 by Dillingham and Toren. Plant with central strand present and without inflated alar cells.

Pseudocampyllum radicale (P. Beauvois) Vanderpoorten & Hedenäs

Rare; on moist wood. Specimens not examined for presence of sporophytes.

Plumas: on damp *Alnus tenuifolia* trunks at margin of fen at Blue Lake, three mi NW of Buck's Lake, 2006, 6300 ft, *Toren 9484* (CAS); on shaded damp fallen log at margin of fen, four mi SE of Bucks Lake, 2006, 4700 ft, *Toren 9500A with Janeway* (CAS).

Note: all of these collections were determined as *Amblystegium radicale* (Palisot de Beauvois) Schimper, but I am including them as *P. radicale* to follow Vanderpoorten (2014).

Pseudoleskea incurvata (Hedwig) Loeske

Rare; on dry rock outcrops at higher elevations. Sporophytes unknown in study area.

Plumas: on volcanic conglomerate rock outcrop underneath moderate forest canopy at margin of Blakeless Creek, 15 mi E of Quincy, 2005, 5951 ft, *CPD & Toren 2149* (RMA); on dry rock outcrop underneath moderate forest canopy, 19 mi E of Quincy, 2005, 6147 ft, *CPD & Toren 2175* (RMA).

Pseudoleskea patens (Lindberg) Kindberg

Common; on rock, bases of hardwood trees and on forest soils. Sporophytes uncommon.

Plumas: on dry rock outcrop underneath *Quercus vaccinifolia* shrubs, 11 mi W of Quincy, 2001, 5819 ft, *CPD, Hanson & Norris 418* (RMA); on exposed rock outcrop in Stag Creek drainage, 33 mi NE of Oroville,

2002, 1704 m, *CPD & Gross 913* (UC). **Sierra:** on boulder underneath moderate forest canopy, five mi E of LaPorte, 2005, 5280 ft, *CPD & Toren 2302* (RMA); on base of *Cornus sessilis* shrub on stream bank of Gold Run Creek underneath dense forest canopy, five mi SW of LaPorte, 2005, 4100 ft, *CPD & Toren 1993* (RMA). **Yuba:** on rock adjacent to tributary to Slate Creek, four mi SW of LaPorte, 2005, 4060 ft, *CPD 1973* (RMA).

Pseudoleskea radicata (Mitten) Macoun & Kindberg

Rare; on dry rock. Sporophytes unknown in study area.

Butte: on shaded limestone boulder along Forest Rd 23N30, three mi E of Cresta, 2009, 4500 ft, *Toren 9719* (CAS). **Plumas:** on granite boulder underneath dense forest canopy, in headwaters of Taylor Creek, nine mi NE of Quincy, 2005, 6743 ft, *CPD 1684* (UC).

Pseudoleskea stenophylla Renauld & Cardot

Uncommon; on bases of hardwoods and on rock. Sporophytes uncommon.

Plumas: on horizontal trunk of *Alnus incana* underneath dense forest canopy, 24 mi NE of Oroville, 2004, 4200 ft, *Toren 9349* (RMA); on metamorphic rock underneath sparse forest canopy, 1 mi W of LaPorte, 2005, 5369 ft, *CPD & Toren 2020* (RMA). **Yuba:** on base of *Alnus rhombifolia* underneath dense forest canopy, three mi E of Strawberry Valley, 2005, 3740 ft, *CPD 1960* (UC).

Pterigynandrum filiforme Hedwig

Common; on tree boles, branches and rock outcrops, generally underneath dense forest canopy. No collections with sporophytes.

Butte: on *Acer macrophyllum* tree bole, six mi E of community of Brush Creek, 2002, 3976 ft, *CPD 806* (UC). **Plumas:** on dry rock outcrop, 12 mi E of Quincy, 2005, 6331 ft, *CPD 2065* (RMA). **Sierra:** on rock boulder underneath dense forest canopy, three mi E of LaPorte, 2005, 4961 ft, *CPD & Toren 2297* (RMA). **Yuba:** on old-growth *Pseudotsuga menziesii* log, three mi E of Strawberry Valley, 2005, 3740 ft, *CPD 1958* (RMA).

Ptychomitrium gardneri Lesquereux

Uncommon; on dry rocks, underneath sparse to moderate forest canopy. Sporophytes common.

Butte: on serpentinite rock underneath sparse canopy, 16 mi E of Chico, 2004, 3010 ft, *CPD 1806* (RMA). **Plumas:** on rock in dry creek bed of Poplar Creek, four mi SW of Cromberg, 2007, 4880 ft, *CPD & Toren 2373* (RMA); on dry rock, 1/4 mi W of Belden, 2006, 2280 ft, *CPD, B. Shaw & J. Shevock 2361* (RMA).

Ptychostomum creberrimum (Taylor) J.R. Spence & H.P. Ramsay

[*Bryum lisae* De Notaris]

Uncommon; on rock along streambanks. Sporophytes common.

Plumas: on eroded rocky stream bank of ephemeral tributary to Middle Fork Feather River, 1.5 mi E of Graeagle, 2004, 4603 ft, *CPD & Toren 1723* (RMA); on rock outcrop on edge of Grassy Lake in open meadow, Lakes Basin, six mi SW of Graeagle, 2001, 6320 ft, *CPD, Hanson & Norris 408* (RMA, Spence); on dry stream bed, two mi S of Portola, 2002, 1648 m, *CPD & Gross 591* (UC, Spence); between Bucks Lake and Meadow Valley, 1934, *Ikenberry 1094* (MO). **Sierra:** on rock in Sulphur Creek, three mi WNW of Calpine, 2002, 1604 m, *CPD & Gross 620* (UC).

Ptychostomum pacificum J.R. Spence & Shevock

Common; on peat soils in fens or wet meadows. Sporophytes rare.

Plumas: on saturated peat soils in fen, 12 mi NW of Quincy, 2002, 1585 m, *CPD & Gross 889* (UC); on saturated soils in fen-like meadow near South Branch Ward Creek, 16 mi E of Quincy, 2005, 6671 ft, *CPD, Toren & Friend 2057* (CAS, UC); on saturated peat soils in Waters Fen, seven mi SW of Quincy, 2001, 5400 ft, *CPD, Hanson & Norris 404* (UC, Spence personal herbarium); on saturated peat soils in fen-like wetland, 7.5 mi NE of Quincy, 2004, 6287 ft, *CPD 1654* (CAS, UC), this is the only collection with sporophytes, dioicous). Note: this species is related to *Ptychostomum turbinatum* (Hedwig) J.R. Spence, but is distinguished by a combination of characters including large size, costa that ends at the leaf apex and with strongly recurved leaf margins. John Spence and Jim Shevock have recently described this species and cited specimens from this work (Spence and Shevock 2012).

Ptychostomum pseudotriquetrum (Hedwig) J.R. Spence & H.P. Ramsay ex Holyoak & N. Pedersen

[*Bryum pseudotriquetrum* (Hedwig) G. Gäertner, B. Meyer & Scherbius]

Abundant; on saturated to ephemerally moist mineral soil, peat or soil over rock in fens, seeps, springs, streams and rock faces underneath forest canopy or in full sun. Sporophytes uncommon.

Butte: on vertical rock wall in seep, two mi NS of Forestown, 2004, 1588 ft, *CPD 1127* (Spence personal herbarium). **Plumas:** on rock in dry creek bed, eight mi NE of Greenville, 2001, 5400 ft, *CPD 477* (UC, Spence personal herbarium); on soil at edge of Grassy Lake, Lakes Basin, six mi SW of Graeagle, 2001, 6320 ft, *CPD, Hanson & Norris 443* (UC); on saturated soils in fen at Greens Flat Fen, 16 mi SW of Quincy, 2003, 5620 ft, *CPD & Toren 1231* (RMA). **Yuba:** on rock in seep at edge of Gold Run Creek underneath moderate forest canopy, five mi SW of LaPorte, 2005, 3975 ft, *CPD & Toren 1986* (RMA).

Ptychostomum weigeli (Sprengel) J.R. Spence

[*Bryum weigeli* Sprengel]

Common; on saturated soils in springs, wet meadows and fens under partial canopy to full sunlight. No collections with sporophytes.

Plumas: on moist soil in wet meadow adjacent to Grizzly Lake, two mi SW of Bucks Lake, 2003, 5150 ft, *CPD, Toren & Heep 1141* (RMA, Spence); on saturated soils in fen-like meadow near South Branch Ward Creek, 16 mi E of Quincy, 2005, 6671 ft, *CPD, Toren & Friend 2058* (RMA); on saturated soils in wet meadow in full sunlight, at margin of South Fork of Long Valley Creek, five mi E of Cromber, 2004, 6074 ft, *CPD 1580* (RMA). **Yuba:** in moss-dominated spring feeding into tributary to Slate Creek underneath moderate forest canopy, four mi SW of LaPorte, 2005, 4200 ft, *CPD 1970* (RMA).

Rhizomnium glabrescens (Kindberg) T.J. Koponen

Common; on the shaded banks of creeks, wet soil over rocks or wet logs. Sporophytes uncommon. **Butte:** on silt-covered rock at edge of Lockerman Creek, 19 mi E of Chico, 2004, 3140 ft, *CPD 1776* (RMA); on rotten wet log at edge of creek in dense shade, 2002, 3790 ft, *CPD 768* (RMA). **Sierra:** on wet, seeping rock face under dense canopy, 2.5 mi S of LaPorte, 2005, 4680

ft, *CPD 2323* (RMA). **Yuba:** on old log laying partially submerged in Brush Creek underneath partial canopy, three mi E of Strawberry Valley and 27 mi E of Oroville, 2005, 3560 ft, *CPD 1957* (RMA).

Rhizomnium magnifolium (Horikawa) T.J. Koponen
Uncommon; on moist soil and stream banks. No collections with sporophytes.

Butte: on moist soil at margin of Lockerman Creek, 19 mi E of Chico and two mi NW of Cresta, 2004, 3140 ft, *CPD 1779* (RMA); on soil, 12 mi E of Paradise, 2009, 1450 m, *Toren & Rhoades s.n.* (CAS 1139082, CHSC 106163). **Plumas:** on streamside humus in Butterfly Valley Botanical Area, five mi NW of Quincy, 2002, 4000 ft, *Laeger 1587* (CAS); on wet shaded soil in hillside seep, north of Four Trees, five mi E of Cresta, 2009, 5100 ft, *Toren & Starkey 9725* (CAS).

Rhizomnium pseudopunctatum (Bruch & Schimper) T.J. Koponen
Uncommon; on saturated soils at fen edges and margins of streams and seeps, often in densely shaded sites. No collections with sporophytes.

Butte: on soil bank above stream, 14 mi W of LaPorte, 2003, 3861 ft, *CPD 773* (UC); on soil in seep under *Azalea*, 11 mi W of LaPorte, 2002, 3940 ft, *CPD 729* (UC). **Plumas:** on saturated organic soils in China Gulch Fen, five mi S of Bucks Lake Lodge, 2003, 5410 ft, *CPD 1040* (RMA); on moist soil in seep at headwaters of Bear Creek, six mi SW of Cromberg, 2007, 6320 ft, *CPD 2379* (RMA).

**Rhynchostegium aquaticum* A. Jaeger
Uncommon; on submerged rocks in creeks or in splash zones of waterfalls. Sporophytes common.

Butte: on rock under dripping water of three ft tall waterfall, 14 mi NE of Oroville, 2002, 2700 ft, *CPD & Gross 804* (UC, MO); on rock in Little Ram Creek, 1.5 mi N of town of Brush Creek, 2002, 2920 ft, *CPD & Gross 1179* (UC). **Plumas:** on rock submerged in Greenhorn Creek, 4.5 mi E of Quincy, 2004, 3700 ft, *CPD & Toren 1646* (RMA).

Note: Recent phylogenetic analysis by Ochyra (2012) reported in Ignatov (2014) indicates the segregate *Platyhypnidium riparioides* (Hedwig) Dixon is not warranted.

**Rhytidadelphus triquetrus* (Hedwig) Warnstorf
Rare; on moist soil in densely shaded sites. Neither collection with sporophytes.

Butte: on moist soil adjacent to small creek, 18 mi E of Chico and 1.5 mi W of Cresta, 2004, 3206 ft, *CPD and Toren 1751* (CAS). **Plumas:** on litter over soil in dry draw, 1 mi SW of Meadow Valley Cemetery, 2003, 3860 ft, *CPD 928* (CAS).

Roellobryon roellii (Brotherus) Ochyra
Common; on organic forest soils and litter in shaded sites. No collections with sporophytes.

Plumas: on moist soil adjacent to small unnamed creek, nine mi WSW of Quincy, 2001, 5200 ft, *CPD 697* (CAS); on dry soil in shaded site S of Grizzly Creek, three mi SE of Storrie, 2003, 4640 ft *CPD & Swartz 1223* (CAS). **Sierra:** on moist soil under dense canopy, six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2241* (CAS).

Note: This taxa was previously known as *Roellia roellii* (Brotherus ex Roll) Andrews ex Crum in Norris and Shevock (2004a).

Rosulabryum canariense (Bridel) Ochyra
[*Bryum canariense* Bridel]

Uncommon; on soil and rock. Sporophytes uncommon.

Butte: on red clay soils on roadcut underneath partial forest canopy, two mi E of Concow Reservoir and 16 mi E of Chico, 2004, 2897 ft, *CPD & Toren 1799* (Spence personal herbarium); on rock underneath sparse forest canopy, 12 mi E of Chico, 2004, 3098 ft, *CPD & Toren 1824* (RMA); on shaded recess of dry, ultramafic-derived rock, 12 mi E of Chico, 2004, 3143 ft, *CPD & Toren 1830* (RMA).

Rosulabryum capillare (Hedwig) J.R. Spence
Uncommon; on soil and rock underneath sparse to dense forest canopy. Sporophytes common.

Butte: on saturated rock in streambed, two mi NW of Forbestown, 2003, 2070 ft, *CPD 1019* (RMA). **Plumas:** on dry forest soil along tributary to Little Grizzly Creek, 13 mi E of Quincy, 2005, 5201 ft, *CPD 2121* (RMA); on damp soil in riparian zone two mi W of Portola, 2002, 4960 ft, *CPD 572* (UC). **Yuba:** on soil of logging road underneath sparse forest canopy, six mi SE of Challenge, 2003, 2800 ft, *CPD 964* (CAS).

Rosulabryum gemmascens (Kindberg) J.R. Spence
Uncommon; on soil and rock under forest canopy. Sporophytes in one of two collections.

Butte: on eroded bank of Ram Creek, two mi NE of Brush Creek community, 2002, 2920 ft, *CPD & Gross 1170* (UC). **Plumas:** on moist vertical rock wall adjacent to tributary to Greenhorn Creek, seven mi E of Quincy, 2004, 3794 ft, *CPD 1290* (RMA, Spence personal herbarium).

Rosulabryum torquescens (Bruch & Schimper) J.R. Spence
Rare; on disturbed soils. No sporophytes on single collection.

Plumas: on soils in disturbed area underneath partial forest canopy at Belden Rest Area, 16 mi NW of Quincy, 2006, 2260 ft, *CPD, Shaw & Kellman 2440* (RMA).

Sanionia uncinata (Hedwig) Loeske
Uncommon; on rocky seeps and splash zones of creeks. One collection with sporophytes.

Plumas: on rock outcrop along Grizzly Creek in shaded site, two mi SW of Bucks Lake, 2004, 5028 ft, *CPD, Toren & Friend 1557* (CAS); on stream boulder in splash zone of Cascade Creek, 13 mi E of Quincy, 2005, 6472 ft *CPD & Toren 2096* (CAS); on seep over rock under closed canopy forest along Rabbit Creek, 1 mi W of LaPorte, 2005, 4890 ft, *CPD & Toren 2031* (CAS).

Schistidium agassizii Sullivant & Lesquereux
Rare; on seasonally submerged rock. Single collection with sporophytes.

Plumas: on seasonally submerged rock in headwaters of tributary to Lost Creek, 1.5 mi W of LaPorte, 2009, 5110 ft, *CPD & Toren 2607* (CAS); on rocks in dry rivulet in Lakes Basin Recreation Area, 2013, 6450 ft, *Shevock 42889* (CAS).

Schistidium ambiguum Sullivant
Rare; on rock. Specimen not examined for presence of sporophytes.

Plumas: on metamorphic rock approximately 1.5 mi S of Bucks Lake, 2009, 5700 ft, *Toren 9710* (CAS, determined by Hans Blom).

**Schistidium atrichum* (Müller Hal. & Kindberg) W.A. Weber

Rare; on soil over rock. Single collection without sporophytes.

Plumas: on soil over volcanic breccias conglomerate rock out crop at margin of Blakeless Creek, 15 mi E of Quincy, 2005, 5951 ft, *CPD & Toren 2148* (CAS).

Schistidium cinclidodonteum (Müller Hal.) B. Bremer
Common; on periodically submerged or seasonally wet rocks. Sporophytes common.

Plumas: on rocks in dry stream bed of Grizzly Creek, two mi SW of Bucks Lake, 2003, 5150 ft, *CPD, Toren & Heep 1146* (UC, CAS); on rock in dry creek bed, two mi S of Portola, 2003, 1612 m, *CPD & Gross 594* (CAS, UC); on rock ephemerally submerged in Long Valley Creek, 20 mi E of Quincy, 2005, 6370 ft, *CPD & Toren 2166* (CAS). **Sierra:** on ephemerally submerged rock along Potosi Creek, 1/4 mi N of Howland Flat and six mi E of LaPorte, 2005, 5619 ft, *CPD & Toren 2234* (CAS). **Yuba:** on sunny concrete water tank of old abandoned campground, five mi S of Challenge, 2010, 2300 ft, *Toren 9747* (CAS).

Note: Two Plumas County collections, *CPD 581 & CPD 583* (both at CAS) were of a short-awned form, previously described as *Schistidium pacificum* (E. Lawton) Ochyra. Including *S. pacificum* as a synonym of *S. cinclidodonteum* follows the current treatment by McIntosh (2007).

Schistidium occidentale (E. Lawton) S.P. Churchill
Uncommon; on periodically submerged rocks. Sporophytes common.

Plumas: on rock cobble in dry stream bed at headwaters of Taylor Creek, nine mi NE of Quincy, 2004, 6345 ft, *CPD & Toren 1673* (CAS); on rock, periodically inundated in stream bed of Long Valley Creek, four mi E of Cromberg, 2004, 5845 ft, *CPD 1571* (CAS).

Schistidium rivulare (Bridel) Podpěra
Common; on periodically submerged rocks. Sporophytes common.

Plumas: on rocks in headwaters of Cascade Creek, 13 mi E of Quincy, 2005, 6472 ft, *CPD & Toren 2104* (RMA); on rock in dry stream, two mi SW of Bucks Lake, 2003, 5150 ft, *CPD, Toren & Heep 1145* (UC); on seasonally inundated rock in stream bed, six mi WSW of Portola, 2002, 4500 ft, *CPD & Gross 635* (Harpel). **Sierra:** on rock in intermittent stream channel, 5.5 mi NE of LaPorte, 2005, 5417 ft, *CPD & Toren 2304* (RMA). **Yuba:** on rock submerged in Gold Run Creek, five mi SW of LaPorte, 2005, 3975 ft, *CPD & Toren 1989* (RMA).

Schistidium splendens T.T. McIntosh, H.H. Blom, D.R. Toren & Shevock

Common; on periodically submerged or seasonally wet rocks. Sporophytes common.

Butte: on ultramafic rock in sheet drainage area of bedrock 12 mi E of Chico, 2004, 3098 ft, *CPD & Toren 1810* (UBC). **Plumas:** on volcanic rock adjacent to streambed, above stream flow, three mi NE of Graeagle, 2004, 5191 ft, *CPD & Toren 1705* (BC); on rock ephemerally submerged in Dolly Creek, 16 mi E of Quincy, 2005, 6272 ft, *CPD, Toren & Friend 2055* (CAS). **Sierra:** on sheet drainage area of steep narrow bedrock gorge in Cedar Grove Ravine, 1/2 mi S of St. Louis and three mi E of LaPorte, 2005, 4745 ft, *CPD &*

Toren 2291 (UBC). **Yuba:** on rock in ephemeral stream channel in headwaters of Little Oregon Creek, two mi S of Challenge, 2003, 2700 ft, *CPD 995* (CAS, UC).

Note: Determined by Blom to represent a new species related to *S. cinclidodonteum* (McIntosh et al. 2015). The leaf lacks the long-channeled apex that is present on *S. cinclidodonteum*.

***Schistidium subjulaceum* H.H. Blom

Rare; single collection on seasonally inundated rocks along stream.

Plumas: on shaded rock in dry streambed, three mi S of Antelope Lake, 12 mi SE of Janesville, 2005, 5384 ft, *CPD 2212 & Toren* (CAS).

Note: collection was determined by Terry McIntosh in July 2014, as a new species to California.

Scleropodium cespitans (Müller Hal.) L.F. Koch

Rare; on clay soils and wood. Single collection examined without sporophytes.

Plumas: on exposed *Calocedrus* roots, along Dixie Canyon Rd, 1997, 1300 m, *Shevock, Ertter & Morosco 15731* (CAS). **Yuba:** on clay soils in bare patches of lawn, Forest Service station at Challenge, 2010, 2560 ft, *Toren 9752* (UC).

Scleropodium obtusifolium (Mitten) Kindberg

Abundant; on seasonally inundated rocks along streams, in seeps and in splash zones of waterfalls and cascading creeks. Most perennial riparian zones in the study area have this plant. Sporophytes rare.

Butte: on wet vertical rock wall in riparian zone, two mi NW of Forbestown, 2003, 1588 ft, *CPD 1095* (UC).

Plumas: on rock in flowing water, three mi E of Portola, 2002, 4960 ft, *CPD 574* (UC); on rock in dry streambed, two mi W of Little Grass Valley Reservoir, 2002, 5460 ft, *CPD 751* (UC). **Sierra:** on rock in seep underneath dense forest canopy, six mi S of LaPorte, 2005, 3800 ft, *CPD 1903* (UC). **Yuba:** on rock in splash zone of perennial tributary to Dry Creek, 1 mi S of Challenge, 2003, 2520 ft, *CPD 1192* (UC).

Note: one collection of a morph listed in Norris and Shevock (2004b) as "species A" was collected: **Plumas:** 24 mi NE of Oroville in unnamed tributary to South Branch Middle Fork Feather River, 2003, 1171 m, *CPD 746* (UC). This morph has rigid stems and leaves wider than long. Carter (2012b, 2014a) was unable to find any molecular differences between *S. obtusifolium* and "species A" and suggested that "species A" represents the extreme end of the broad spectrum of morphological variation typical of many aquatic bryophytes".

Scleropodium occidentale B.E. Carter

Rare; single collection on seasonally inundated rocks along stream.

Plumas: on rock in dry streambed, two mi W of Little Grass Valley Reservoir, 2002, 5460 ft, *CPD 751* (UC); on rock in small stream, Feather River Canyon, Plumas National Forest, 1979, no elevation available, *Norris 52600* (UC).

Note: *S. occidentale* was described by Carter (2012b) after the majority of the fieldwork for this flora was completed and included *Norris 52600* in his list of specimens examined. It may be more common in lower elevations along relatively smaller and drier drainages in oak dominated habitats as compared to habitats used by *S. obtusifolium* (B. Carter personal com-

munication 2014). Sporophytes not present on single collection.

Scleropodium touretii (Bridel) L.F. Koch

Common; on trailside and roadside banks in forest. Sporophytes uncommon.

Butte: on dry soil on road cutbank underneath sparse forest canopy, three mi N of Forbestown, 2003, 2250 ft, *CPD 1097* (UC) **Plumas:** on seepy sandstone in open scabland with sparse forest canopy, two mi N of Graeagle, 2004, 5529 ft, *CPD 1467* (UC). **Yuba:** on roadside soils underneath moderate forest canopy, five mi SE of Challenge, 2003, 2220 ft, *CPD 957* (UC, Harpel personal herbarium); on *Pseudotsuga* in forest campground above Bullard Bar Dam, 1975, 2000 ft, *Weber B-48297* (MO); on gravelly serpentine, 3.1 km S of Woodleaf, 810 m, *Janeway & Williams 10793* (CAS).

Scopelophila ligulata (Spruce) Spruce

Rare; on roadside cutbank of mineral rich soils. No sporophytes at known site.

Plumas: on mineral soils in seep on roadside cutbank through phyllite rock type, five mi E of Twain and 1/8 mi north of Paxton in Feather River Canyon, 2004, 2993 ft, *Toren & Dillingham 9351* (CAS, MO, UC) and *CPD 1836* (CAS, Harpel personal herbarium,) and *Shevock 28933* (CAS).

Note: This was the first collection of this species in California.

Scouleria aquatica Hooker

Uncommon; aquatic species growing on rock under running streams. No collections with sporophytes.

Plumas: on rock in dry stream bed near Gold Lake, 11 mi W of Quincy, 2001, 6010 ft, *CPD, Hanson & Norris 438* (UC); underwater on rock in perennial stretch of Poplar Creek, four mi SW of Cromberg, 2007, 4760 ft, *CPD & Toren 2374* (RMA); on rock under flowing water in tributary to Cashman Creek, seven mi NE of Quincy, 2004, 5906 ft, *CPD 1418* (RMA). **Sierra:** on rock in ephemeral stream channel underneath moderate forest canopy, five mi E of LaPorte, 2005, 5280 ft, *CPD & Toren 2303* (RMA).

Scouleria marginata E. Britton

Rare; aquatic species growing on rock under running streams. Specimen not examined for presence of sporophytes.

Plumas: on rock at Indian Falls of Indian Creek, 11 mi W of Quincy, 1955, 2800 ft, *Lawton 3132* (MO).

Sphagnum angustifolium (Warnstorf) C.E.O. Jensen

Rare, this is the only record in California, on saturated fen soils. No collections with sporophytes.

Sierra: on saturated peat soils underneath moderate forest canopy in a fen with *Darlingtonia californica*, four mi S of LaPorte, 2005, 4540 ft, *CPD 2335* (UC, CAS, CHSC, NY, determined by Flatberg Feb 2006 and verified by Dillingham and Jon Shaw Feb 2007).

Sphagnum capillifolium (Ehrhart) Hedwig

Rare, on moist peat soils under shrubs. No collections with sporophytes.

Plumas: Along unnamed tributary to Mill Creek in Bucks Lake Wilderness, persisting underneath *Kalmia* shrubs in cattle trampled meadow, 2001, 5960 ft, *CPD 460*, (NY) (determined by Shaw).

Note: determined as *S. russowii* Warnstorf by Andrus (Jan 2004), but Jon Shaw and Dillingham agree that it is *S. capillifolium* (Feb 2007).

Sphagnum miyabeianum Warnstorf

Uncommon, on saturated fen soils. This is the most common *Sphagnum* on the Plumas NF. No collections with sporophytes.

Plumas: Silver Lake Fen adjacent to Bucks Lake Wilderness, on saturated soils mixed with *Aulacomnium palustre*, 2001, 5900 ft, *CPD 427* (NY, determined by Andrus) and *CPD 435* (NY) and *Shaw 13697-13721* (DUKE); Blue Lake Fen, Bucks Lake Wilderness, on saturated peat soils in *Menyanthes trifoliata* dominated fen with pH of 5.4, 2004, *Belsher-Howe s.n. 17 Aug 2004* (NY); Waters Fen E of Tamarack Flat, in cattle trampled fen mixed with *Meesia triquetra*, 2002, 5400 ft, *CPD 816*, (NY, determined by Andrus); Along unnamed tributary to Mill Creek in Bucks Lake Wilderness, persisting underneath *Kalmia* shrubs in cattle trampled meadow, 2001, 5960 ft, *CPD 459*, (NY, determined by Andrus); Helgrammite Lake, on saturated soils and partially submerged at edge of small pond, 2002, *CPD 1137*, (NY, Determined by Andrus).

Note: *S. subsecundum* Nees in Sturm collections from California have recently been determined to represent the species *Sphagnum miyabeianum* (Shaw et al. 2014). Therefore, all *S. subsecundum* specimens from this study are being named *S. miyabeianum*. Two specimens (duplicates at NY) previously determined as *S. mendocinum* Sullivant (*CPD 435* and *Belsher-Howe s.n.*) by Andrus were determined as *S. subsecundum* (now *S. miyabeianum*) by Dillingham and Jon Shaw, Feb 2007.

Sphagnum squarrosum Crome

Uncommon, on saturated fen soils. No collections with sporophytes.

Plumas: Willow Lake in Lassen NF, on floating mat of vegetation, 2004, 5800 ft, *CPD 1650* (NY, verified by Andrus); Rogers Lake, two mi W of Bucks Lake, 2006, 5400 ft, *Toren 9510* (CAS, determined by Janssens); Plumas N.F., specimen not located, 2004, *Bishop s.n.*, (NY, determined by Janssens).

Sphagnum teres (Schimper) Ångström ex Hartman

Rare; on saturated soils in fen. Single collection reviewed without sporophytes.

Plumas: all collections from Willow Lake fen, 16 mi NW of Chester, 5800 ft; 1893, *R.M. Austin s.n. with Bruce* (NY, determined by Andrus); 1898 *Bruce 2398* (NY determined by Andrus); 2002, *Sanger s.n. 19 July 2002* (RMA, determined by the author).

Straminergon stramineum (Dickson ex Bridel) Hedenäs

Rare, on saturated fen soils. No collections with sporophytes.

Plumas: on wet, slightly raised rotted log, imbedded in *Sphagnum* fen, Rogers Lake, S of Grizzly Lake, two mi SW of Bucks Lake, 2006, 5350 ft, *Toren 9508* (CAS) also collected same day and locality by *Janeway 8938* (CHSC); Willow Lake fen, 16 mi NW of Chester, 1897, 5800 ft, *R.M. Austin s.n.* (NY).

Syntrichia latifolia (Bruch ex Hartman) Huebener

Rare; single collection on concrete. Single collection with sporophyte.

Yuba: on sunny concrete water tank of old abandoned campground, five mi S of Challenge, 2010, 2300 ft, *Toren 9746* (RMA).

Syntrichia montana Nees

Rare; on concrete. Sporophytes present on single collection.

Yuba: on sunny concrete water tank of old abandoned campground, five mi S of Challenge, 2010, 2300 ft, *Toren 9746* (RMA).

Note: Although this species was not in the catalogue of California mosses (Norris and Shevock 2004a), it is not considered new to California because it is listed in both Mishler (2007) and Malcolm et al. (2009) as occurring in California.

Syntrichia norvegica F. Weber

Rare, on open exposed soils at higher elevations. One of two collections with sporophytes.

Plumas: on dry rock outcrop within mixed conifer forest between Rogers and Grizzly Lakes, two mi SW of Bucks Lake, 2003, 5220 ft, *CPD, Toren & Heep 1156*, (RMA); on exposed volcanic conglomerate rock outcrop above headwaters of Cascade Creek, 13 mi E of Quincy, 2005, 625 ft, *CPD & Toren 2086* (RMA, verified by Kellman).

Syntrichia princeps (De Notaris) Mitten

Common; on rocks, soil and tree trunks. The most common *Syntrichia* species in the study area. Sporophytes common.

Butte: on soil underneath dense mixed coniferous forest, at Brush Creek Guard Station in community of Brush Creek, 2002, 3551 ft, *CPD 514* (UC). **Plumas:** on forested slope underneath mixed conifer forest, two mi E of Portola, 2002, 5240 ft, *CPD 577* (UC). **Sierra:** on shaded boulder near Gibson Creek, five 1/2 mi NE of LaPorte, 2005, *CPD & Toren 2258* (RMA). **Yuba:** on *Quercus kelloggii* trunk in mixed coniferous and deciduous forest, six mi SE of Challenge, 2003, 2740 ft, *CPD 947* (UC).

Syntrichia ruralis (Hedwig) F. Weber & D. Mohr

Common; on rocks, soil and seeps. Sporophytes common.

Plumas: on granite rock outcrop, six mi SW of Portola, 2002, 1491 m, *CPD 555* (UC); on moss-covered base of monolithic 50-ft tall vertical conglomerate volcanic rock with calcium deposits, 13 mi E of Quincy, 2005, 6452 ft, *CPD 2098* (RMA); in seep on rock wall, five mi E of East Quincy, 2005, 3794 ft, *CPD 1292* (RMA).

Syntrichia species A

Uncommon; on rocks. Sporophytes common.

Plumas: on dry granitic rock outcrop, 13 mi SE of Janesville, 2005, 4677 ft, *CPD & Toren 2200* (RMA).

Sierra: on rock outcrop underneath dense forest canopy at Little Rock Creek/Rock Creek confluence, six mi S of LaPorte, 2005, 3800 ft, *CPD 1900* (CAS, determined by Kellman).

Note: This undescribed species is characterized by strap-shaped leaves, the very wide costa at the base, the margins recurved at most to 3/4 leaf, but often less, lack of hydroids, a relatively narrow steredid band that reaches the apex of the leaf, thick-walled guide and abaxial costal cells, and the moist leaves at most spreading, not squarrose like *S. ruralis*.

Timmiella crassinervis (Hampe) L.F. Koch

Common; on soil under forest canopy. Sporophytes uncommon.

Butte: on soil in tributary to Sucker Run Creek, 15 mi E of Oroville, 2003, 2780 ft, *CPD 1025* (RMA, Harpel).

Plumas: on soil over wood along headwaters of Cascade Creek, 13 mi E of Quincy, 2005, 6472 ft, *CPD 2092* (RMA). **Sierra:** on clay soil at margin of headwater tributary to Gold Run Creek, five mi SW of LaPorte, 2005, *CPD & Toren 1998* (RMA).

Tortula hoppeana (Schultz) Ochyra

[*Tortula euryphylla* R.H. Zander]

Uncommon; on soil or on soil over rock in full sun. Sporophytes common.

Plumas: on dry, rocky soil near base of volcanic conglomerate rock outcrop, 13 mi E of Quincy, 2005, 6452 ft, *CPD 2102* (MO); in crevice of large rock outcrop, 11 mi E of Quincy, 2005, 6914 ft, *CPD 2118* (RMA); on soil pocket in volcanic conglomerate rocky cobble in poorly vegetated landscape, 16 mi E of Quincy, 2005, 6476 ft, *CPD & Toren 2155* (RMA).

Tortula subulata Hedwig

Uncommon; on moist creek banks to soil in dry rock outcrop crevices. Sporophytes common.

Plumas: on forest floor adjacent to thimbleberry patch, S side of Marion Ravine, 1998, 4800 ft, *Janeway 5702* (MO); on wet soil on creek bank of Black Gulch, eight mi W of Quincy, 2002, 4000 ft, *Gross & CPD 893* (UC). **Sierra:** on soil of upturned root wad underneath dense forest canopy adjacent to Little Rock Creek, six mi S of LaPorte, 2005, 3920 ft, *CPD 1875* (RMA).

Trichodon cylindricus (Hedwig) Schimper

Uncommon; on disturbed soil. Sporophytes uncommon.

Plumas: on disturbed soil of upturned root wad along headwaters of Middle Creek, three mi W of Antelope Lake and 13 mi SW of Janesville, 2005, 5990 ft, *CPD 2220* (RMA); on moist soil adjacent to Onion Creek, 10 mi E of LaPorte, 2007, 6300 ft, *CPD 2351* (RMA); on dry soil of roadside cutbank under forest canopy near South Fork of Long valley Creek, four mi E of Cromberg, 2004, 5845 ft, *CPD 1575* (RMA); on moist silty soils in entrance to mountain beaver (*Aplodontia rufa*) burrow in Long Valley Creek drainage, 20 mi E of Quincy, 2005, 6587 ft, *CPD & Toren 2174* (RMA). **Sierra:** on moist soil of roadside ditch near historical town site of Queen City, three mi SE of LaPorte, 2005, 4920 ft, *CPD 2275* (RMA).

Warnstorfia exannulata (Schimper) Loeske

Rare; on wet soil. Sporophytes absent on single collection.

Plumas: on wet, but not saturated soil, in full sun at Bucks Lake Fen, 2005, 6060 ft, *Bishop s.n. 25 Aug 2005* (Janssens personal herbarium, RMA).

Weissia controversa Hedwig

Uncommon; on soil. Sporophytes common.

Butte: on red clay soils on roadcut under forest canopy, 16 mi E of Chico and two mi E of Concow Reservoir, 2004, 2897 ft, *CPD & Toren 1800* (RMA). **Plumas:** on moist soil under short grass, five mi NE of Quincy, 2004, 4329 ft, *CPD 1313* (RMA); on rock 1 mi W of Onion Valley, eight mi NE of LaPorte, 2008, 6100 ft, *Toren 9645* (MO). **Sierra:** on shallow soil over rock adjacent to Canyon Creek, five mi SE of LaPorte, 2005, 4200 ft, *CPD & Toren 2314* (RMA).

Zygodon rupestris Schimper ex Lorentz

Rare; on tree trunk of hardwoods. Single collection without sporophytes.

Yuba: on shaded trunk of *Acer macrophyllum*, on Oregon Hill Rd two mi S of Challenge, 2010, 2700 ft, Toren 9759 (RMA).

APPENDIX 2

EXCLUDED SPECIES

Eurhynchium striatum (Schreber ex Hedwig) Schimper. Revaluation was completed on two specimens cited in Norris and Shevock (2004a), CPD 965 and CPD 747 by B. Allen, D. Toren, J. Harpel (personal communication 2004) and the author. Specimen CPD 965 was determined as *Kindbergia praelonga* (Hedwig) Ochyra by Allen and the author. Specimen CPD 747 (CAS) has been determined as *Brachythecium frigidum* (Muller Hal) Beschereille by Harpel, Toren, and the author.

Imbriobryum gemmiparum (De Notaris) J.R. Spence. Revaluation of a specimen (Norris 69975) cited in Norris and Shevock (2004a) as *Bryum gemmiparum* De Notaris by Toren in April 2015 revealed that it was *I. torenii* J.R. Spence & Shevock.

APPENDIX 3

Possible additions to the Flora: these have been found in the Sierra Nevada Mountain Range, north of Highway 50 north to the vicinity of Lassen National Park and National Forest or in the foothills and grasslands in Butte, Yuba, and Tehama counties. Additional species were included if communications with other bryologists, particularly David Toren, suggested suitable habitat on Plumas National Forest.

Acaulon rufescens A. Jaeger – known from Sierra County, Tahoe N.F.

Aloina aloides var. *ambigua* (Bruch & Schimper) E.J. Craig – potential habitat on Plumas National Forest.

Andreaea nivalis Hooker – known from Lassen and Yosemite N.P.

Andreaea rupestris Hedwig – throughout Sierras.

Barbula unguiculata Hedwig – Butte County, three mi E of Palermo.

Bartramia aprica Müller Hal. – Nevada County, Hwy 20 about seven mi W of Rough and Ready.

Brachythecium rutabulum (Hedwig) Schimper – Sierra County, Tahoe N.F.

Crossidium squamiferum (Viviani) Juratzka – potential habitat on Plumas National Forest.

Dicranella howei Renauld & Cardot – Nevada County, Tahoe N.F., Butte County, Lake Oroville.

Dicranella varia (Hedwig) Schimper – apparently suitable habitat on Plumas National Forest.

Dicranum fuscescens Turner – potential habitat on Plumas National Forest.

Entosthodon californicus (Sullivant & Lesquereux) H.A. Crum & L.E. Anderson – per Toren.

Ephemerum serratum (Schreber ex Hedwig) Hampe – apparently suitable habitat on Plumas National Forest.

Fissidens curvatus Hornschuch – Butte County, Big Chico Creek.

Fontinalis hypnoides Hartman – Nevada County, Bowman Lake; Plumas County, headwaters of Feather River.

Funaria muhlenbergii Turner – potential habitat on Plumas National Forest.

Gemmabryum gemmilucens (R. Wilczek & Demaret) J.R. Spence – Butte County, north of Gridley.

Gymnostomum aeruginosum Smith – Tehama County: bluff overlooking Battle Creek near Manton, Norris 21339 (cited in Norris and Shevock 2004a).

Gymnostomum viridulum – apparently suitable habitat on Plumas National Forest.

Hennediella stanfordensis (Steere) Blockeel – potential habitat on Plumas National Forest.

Homalothecium arenarium (Lesquereux) E. Lawton – Tehama County, Hwy 36 E of Red Bluff.

Microbryum davallianum (Smith) R.H. Zander – Butte County, Lime Saddle Marina, five mi W of Forest Boundary.

Microbryum starckeanum (Hedwig) R.H. Zander – Tehama County, 10 mi E of Red Bluff.

Mnium arizonicum J.J. Amann – Known from Southern Sierras north to Modoc County.

Orthotrichum lyellii Hooker & Taylor – found by Lake Oroville at Lime Saddle. All specimens examined by author were *O. papillosum*. Additional specimens labeled as this taxon occur at NY that have not been reviewed.

Orthotrichum norrisii F. Lara, R. Medina & Garilleti – potential habitat on Plumas National Forest.

Phascum cuspidatum Schreber ex Hedwig – Shasta County, Hwy 299 E of Redding.

Pohlia longibracteata Brotherus – Nevada County, Hwy 20, Tahoe N.F.

Pseudocrossidium obtusulum (Lindberg) H.A. Crum & L.E. Anderson – Placer County, Hwy 49.

Pseudotaxiphyllum elegans (Bridel) Z. Iwatsuki – Kings Creek, Lassen Volcanic National Park.

Schistidium flaccidum (De Notaris) Ochyra – Shasta County, Warner Valley, Lassen Volcanic N.P.

Scleropodium julaceum E. Lawton – potential habitat on Plumas National Forest.

Tortula atrovirens (Smith) Lindberg – potential habitat on Plumas National Forest.

Tortula muralis Hedwig – Lassen County, Hwy 139.

APPENDIX 4

MOSSES BY HABITAT

Tree bark: *Alsia californica*, *Antitrichia californica*, *Brachytheciastrum velutinum*, *Claopodium bolanderi*, *Dendroalsia abietina*, *Dicranoweisia cirrata*, *Homalothecium nuttallii*, *Hypnum circinale*, *Isothecium cristatum*, *Isothecium stoloniferum*, *Neckera menziesii*, *Neckera douglasii*, *Orthodicranum tauricum*, *Orthotrichum obtusifolium*, *Orthotrichum papillosum*, *Nogopterium gracile*, *Syntrichia princeps*, *Zygodon rupestris*.

Leaf litter: *Kindbergia oregana*, *Leucolepis acanthoneura*, *Homalothecium megaptilum*.

Rotting wood on Forest Floor: *Amblystegium serpens*, *Aulacomnium androgynum*, *Brachytheciastrum velutinum*, *Buxbaumia viridis*, *Claopodium crispifolium*, *Dicranoweisia cirrata*, *Isothecium cristatum*, *Isothecium stoloniferum*, *Orthodicranum tauricum*.

Forest Soils: *Atrichum selwynii*, *Brachythecium albicans*, *Brachytheciastrum velutinum* var. *salicinum*, *Rosulabryum canariense*, *Rosulabryum capillare*, *Claopodium bolanderi*, *Claopodium whippleanum*, *Epipterygium tozeri*, *Kindbergia praelonga*, *Fissidens crispus*, *Porotrichum bigelovii*, *Timmiella crassinervis*, *Weisia contro-versa*.

Fens: *Aulacomnium palustre*, *Brachythecium salebrosum*, *Campylium polygamum*, *Cratoneuron filicinum*, *Drepanocladus aduncus*, *Drepanocladus polycarpon*, *Drepanocladus sordidus*, *Meesia triquetra*, *Meesia uliginosa*, *Ptychostomum pacificum*, *Ptychostomum pseudotriquetrum*, *Ptychostomum weigelii*, *Sphagnum angustifolium*, *Sphagnum capillifolium*, *Sphagnum miyabeianum*.

Springs and Seeps: *Amblystegium serpens*, *Aulacomnium palustre*, *Brachythecium frigidum*, *Bruchia bolanderi*, *Campylium polygamum*, *Cratoneuron filicinum*, *Crumia latifolia*, *Drepanocladus aduncus*, *Drepanocladus polycarpon*, *Imbribryum miniatum*, *Imbribryum muehlenbeckii*, *Ptychostomum pseudotriquetrum*, *Ptychostomum weigelii*, *Rosulabryum gemmascens*.

Submerged in Streams: *Crumia latifolia*, *Dichodontium pellucidum*, *Drepanocladus aduncus*, *Fissidens bryoides*, *Fissidens grandifrons*, *Fissidens ventricosus*, *Hygrohypnum bestii*, *Imbribryum miniatum*, *Imbribryum muehlenbeckii*, *Rhynchostegium aquaticum*.

Creek banks and stranded rocks in creek beds: *Atrichum selwynii*, *Brachythecium frigidum*, *Imbribryum muehlen-*

beckii, *Claopodium whippleanum*, *Codriophorus acicularis*, *Dichodontium pellucidum*, *Didymodon norrisii*, *Epipterygium tozeri*, *Eurhynchium pulchellum*, *Fissidens bryoides*, *Fissidens crispus*, *Fissidens grandifrons*, *Fissidens pauperculus*, *Fissidens ventricosus*, *Grimmia lisae*, *Kindbergia praelonga*, *Leucolepis acanthoneura*, *Neckera menziesii*, *Mnium marginatum*, *Pohlia longibracteata*, *Pohlia wahlenbergii*, *Porothamnium bigelovii*, *Rhizomnium glabrescens*, *Scleropodium obtusifolium*.

Disturbed Places and very poor soil: *Anomobryum julaceum*, *Barbula convoluta*, *Bryum argenteum*, *Ceratodon purpureus*, *Dicranella rufescens*, *Didymodon vinealis*, *Fissidens sublimbatus*, *Funaria hygrometrica*, *Polytrichum juniperinum*, *Rosulabryum canariense*, *Rosulabryum torquescens*, *Timmiella crassinervis*.

Shaded or Moist Rocks: *Amphidium californicum*, *Anacolia baueri*, *Bartramia ithyphylla*, *Blindia acuta*, *Brachythecium albicans*, *Hygrohypnum ochraceum*.

Dry and exposed Rocks: *Anacolia menziesii*, *Andreaea heinemannii*, *Brachytheciastrum collinum*, *Bryum calobryoides*, *Rosulabryum canariense*, *Gemmabryum violaceum*, *Bucklandiella heterosticha*, *Dendroalsia abietina*, *Didymodon insulanus*, *Didymodon norrisii*, *Didymodon vinealis*, *Frisvollia varia*, *Grimmia anomala*, *Grimmia hamulosa*, *Grimmia laevigata*, *Grimmia leibergii*, *Grimmia lisae*, *Grimmia montana*, *Grimmia pulvinata*, *Grimmia ramondii*, *Grimmia reflexidens*, *Grimmia serrana*, *Grimmia torquata*, *Grimmia trichophylla*, *Hedwigia stellata*, *Homalothecium nuttallii*, *Isothecium cristatum*, *Isothecium stoloniferum*, *Orthotrichum rupestre*, *Pseudobraunia californica*, *Ptychomitrium Gardneri*, *Syntrichia princeps*.

Concrete and pavement: *Bryum argenteum*, *Bryum lanatum*, *Ceratodon purpureus*, *Funaria hygrometrica*, *Grimmia pulvinata*, *Homalothecium nuttallii*, *Hygroamblystegium tenax*, *Syntrichia latifolia*, *Syntrichia montana*, *Syntrichia ruralis*.

Lawn Weeds or in Irrigated Gardens: *Ceratodon purpureus*, *Funaria hygrometrica*, *Scleropodium cespitosum*.

Winter Ephemerals: very little work has been done surveying grasslands in early spring in this area. *Pleuridium subulatum*.

Grasslands: *Bryum argenteum*, *Ceratodon purpureus*, *Didymodon vinealis*, *Ditrichum schimperi*, *Fissidens sublimbatus*, *Funaria hygrometrica*, *Pleuridium subulatum*, *Polytrichum juniperinum*.